BRITISH MEDICAL JOURNAL

LONDON SATURDAY NOVEMBER 23 1940

TREATMENT OF BURN SHOCK WITH PLASMA AND SERUM

BY

D. A. K. BLACK, M.D., M.R.C.P.

Beit Memorial Research Fellow in the Nuffield Department of Clinical Medicine, Oxford

The use of plasma or serum protein in the treatment of shock from extensive burns has frequently been advocated, and there is ample theoretical justification for protein-containing infusions, in view of the constant presence of haemoconcentration and reduced plasma volume in any severe burn. Nevertheless, published accounts of the effects of such treatment are few, and the data given are somewhat incomplete, particularly with regard to blood volume and serum electrolyte concentration. Trusler *et al.* (1940) and Elkinton (1939) have each reported two patients who were treated by plasma infusion with benefit.

This paper deals with eight patients with burns or scalds, of whom seven were treated by plasma or serum, or both. The plasma used was obtained by separation from blood taken into standard M.R.C. bottles containing 180 c.cm. of citrate solution, so that the final product may best be described as "half-strength plasma." The solution of serum protein was made up by the addition of sterile water to dried serum, and the solution used was four times the concentration of the original serum. The schedule of investigations which we proposed to ourselves included the determination of blood and plasma volume, haematocrit, haemoglobin and red cells, protein and albumin, chloride, bicarbonate and urea, sodium and potassium. These were to be determined before and after the infusion of plasma or serum and after complete recovery from the burn. It was not possible to carry out the full programme in all cases, since one or both arms were often involved in the burn; but a complete record was obtained in Cases 3 and 5; and, with the exception of blood volume, all the proposed data were obtained in the other cases. Besides the blood examination, records were kept of the pulse and blood pressure, and frequent notes of the patient's general condition were taken.

The following were the technical methods used: Blood and plasma volume: vital red method (Keith *et al.*, 1915). Haemoglobin: Haldane. Blood urea: urease and Nesslerization (Archer and Robb, 1925). Plasma protein: biuret colorimetric (Harrison, 1937). Plasma chloride: Whitehorn titration (Harrison, 1937). Plasma bicarbonate: volumetric (van Slyke, 1917). Serum sodium: triple acetate (Peters and van Slyke, 1931). Serum potassium: cobaltinitrite (Peters and van Slyke, 1931).

Results

The numerical findings, together with brief clinical notes on the cases, are given in an appendix. The data obtained may be discussed in their relation to the pathology of burn shock and the effect of treatment with plasma proteins.

General Clinical Observations

With the exception of the sixth case, in which injury was slight in extent and degree, the burn was followed in less than an hour by the appearance of severe and increasing shock. Pallor, with slight cyanosis, of the lips and skin, shallow frequent breathing, a mental state bordering on apathy, a supine position with occasional restless alteration, were all in conformity with classical descriptions of the shock syndrome. The superficial veins were collapsed and contained dark inspissated blood, which flowed very slowly into the syringe. Spontaneous vomiting was not common, but even small amounts of water provoked retching. The pulse was rapid and small in volume, and the systolic blood pressure was often below 100 mm., although fall in pressure was relatively late in onset. There was no remission after the onset of shock symptoms such as would justify a distinction between primary and secondary shock in these patients.

Three infusions of fourfold serum, from 150 to 300 c.cm. in amount, and six infusions of plasma, from 500 to 2,000 c.cm., were given to seven patients. The fourth patient, who was burnt over more than half the body surface, did not respond to concentrated serum infusion. The other eight infusions were all followed by definite, in some cases dramatic, improvement. Peripheral cyanosis disappeared, the veins filled out, and mental apathy gave place to alertness; this mental quickening was sometimes evidenced by a new consciousness of pain in the burnt area. Patients were better able to take fluids by mouth, and to retain them. The blood pressure rose in cases in which it was much diminished before the infusion; increase in the volume of the pulse was more notable than decrease in rate, although in the third case a pulse rate of 156 fell to 100 within an hour, during which 300 c.cm. of fourfold serum had been given. No post-transfusion reaction occurred after either serum or plasma.

Haematology

Moon (1939) has emphasized the importance of haemoconcentration in the early recognition of shock. The results on our patients give full support to his conclusions, which were mainly based on work with animals. In Case 6 the

haemoglobin and haematocrit percentages were decidedly raised, although blood pressure and pulse were normal and signs of shock were very slight. Moreover, the rise in red cell count, haematocrit, and haemoglobin persisted in all the cases for many hours after other signs of shock had disappeared. Haemoconcentration is in itself important in the pathology of burn shock as increase in red cells increases the viscosity of the blood (Bence, 1906), adding to the circulatory embarrassment; in Case 4, the only patient of the series who died from shock, the haemoglobin rose from 106 to 132 and the haematocrit from 52 to 59 before death. Blood-volume estimations carried out on three of the patients showed that the total volume of red cells was always within normal limits and that diminution of plasma volume accounted both for the haemoconcentration and for the fall in total blood volume. The presence of haemoconcentration differentiates burn shock very clearly from shock secondary to haemorrhage; and it is hoped to publish evidence that haemorrhagic shock, where the deficient blood volume is primarily due to loss of red cells, does not respond to plasma infusion in the same way as shock due to burns.

It was found that, while infusion of half-strength plasma was always followed by dilution of circulating blood, fourfold serum failed to produce haemodilution in two cases out of three. Even with plasma the haemodilution was smaller than might have been anticipated from the greatly improved general state of the patient; it would seem, in fact, that moderate degrees of haemoconcentration are compatible with the absence of any clinical shock. The repeated blood-volume estimations in the fifth case illustrate the mechanism of haemodilution after plasma infusion. The total plasma volume rose from 1.5 to 3 litres, while the red cell volume remained practically unchanged, the increase in total blood volume being 1.4 litres; at the same time the haematocrit fell from 66 to 51.

Biochemical Findings

(i) *Plasma Proteins.*—For convenience of reference the initial values for protein, chloride, bicarbonate, and urea in six severely burnt patients have been grouped in Table I.

TABLE I.—*Blood Chemistry after Burns*

Case	Plasma Chloride mg. per 100 c.cm.	Plasma Bicarbonate mg. per 100 c.cm.	Blood Urea mg. per 100 c.cm.	Plasma Protein gm. per 100 c.cm.	Albumin : Globulin Ratio
1	726	44	26	4.2	2 : 1
2	580	56	36	8.0	1.5 : 1
3	560	53	30	7.3	5 : 1
4	641	34	32	5.8	2.2 : 1
5	569	50	65	5.0	2.3 : 1
6	—	—	30	5.5	1.4 : 1

Less reduction was encountered in the concentration of plasma protein than might have been anticipated from a knowledge of the large quantities of protein-containing exudate from and into burnt areas. In fact, the average plasma-protein value in six cases before any form of treatment had been given was 6 grammes per 100 c.cm. It would appear that plasma-protein concentration is quite well maintained, either by rapid mobilization of tissue-protein stores, whose labile character has been emphasized by Whipple (1938), or by loss of fluid in amounts comparable to the loss of protein, leading to reduction in plasma volume. The figures for the third case show that very large amounts of protein may be lost: at 5.45 a.m. on June 10, 1940, the plasma-protein concentration was 7.3 grammes per 100 c.cm. and the plasma volume 2.5 litres, so that the total plasma protein was 182 grammes; at 11.30 a.m. on the same day the corresponding figures were 7.5 grammes per 100 c.cm. and 2.6 litres, giving a total plasma protein of 195 grammes, an increase of 13 grammes. In the interval, however, an infusion of 300 c.cm. of fourfold serum, containing 60 grammes of protein, had been given, so that 47 grammes must have been lost in less than six hours, even if no tissue protein were mobilized in that period. By the next day the total plasma protein had fallen to 120 grammes, indicating the loss of another 75 grammes of protein at least. These figures may be compared with the normal value for this patient of 210 grammes of total plasma protein obtained after recovery. No significant decrease in the ratio of albumin to globulin was observed in these patients.

The giving of plasma or serum did not produce any great rise in plasma-protein concentration; in the cases in which blood-volume figures are available and total plasma protein can be calculated it was found that a rise in total plasma protein occurred. The extent of this increase could not, however, be predicted from the quantity of protein administered, presumably since it was modified on the one hand by continuing exudation and on the other by the influx of protein from the liver and other tissues into the blood.

(ii) *Bicarbonate, Chloride, and Urea.*—The bicarbonate content of the plasma is diminished in burns, as in other forms of shock, and the lowering of alkali reserve is greater in the more severely shocked patients. Previous chloride estimations in patients with burn shock have been done as a rule on whole blood, and Underhill *et al.* (1923) found reduction in blood chlorides; since the chloride content of red cells is less than that of plasma by almost 100 mg. per 100 c.cm. this reduction in whole-blood chloride can be largely accounted for by haemoconcentration; and in fact Underhill found that the chloride reduction was roughly proportional to the degree of haemoconcentration present. Our patients showed rather high values for plasma chloride, a finding which is in good accord with the reduction in plasma bicarbonate.

The urea content of the blood was normal in five out of six cases on the initial estimation, although a moderate rise in blood urea was sometimes encountered a day or two after the burn; this finding, which has been confirmed in a number of cases of shock from other causes, is a surprising one when it is remembered how frequently azotaemia is associated with even mild degrees of acidosis or dehydration, both of which may be present in burns.

(iii) *Sodium and Potassium.*—Serum sodium and potassium were determined in four cases. The changes in serum sodium after burns have been intensively studied by Wilson and Stewart (1939); in agreement with these authors we found a fall in serum sodium during the stage of shock; the sodium value rose after serum infusion. Our values for serum potassium are of interest in relation to the importance attached by Scudder (1940) to an elevation of serum potassium in all forms of shock. Serum was obtained in our cases by centrifugation within five minutes of venepuncture, and under these conditions the rise in potassium was slight, being never greater than 10 mg. per 100 c.cm. above the normal value. In two cases in which it was possible to observe the serum potassium before and after protein infusion a fall of 3 to 4 mg. in the serum potassium was found.

The Nature of Burn Shock

The haematological and biochemical investigations which have been carried out in cases of burns make it clear that loss of protein and fluid from the circulating blood stream is a prime cause of the shock syndrome in these patients. Controversy has centred on the question whether local loss of fluid and protein in the burnt area is sufficient to account for diminution in circulating blood volume or whether there is also a generalized increase in capillary permeability, with a tendency to widespread loss of fluid into the tissues. While oedema of the limbs is uncommon in shocked patients, perhaps owing to peripheral vasoconstriction, visceral oedema is a common finding, both in experimental animals (Moon, 1938) and in man (Robb-Smith, 1940). Moon postulates that a capillary dilating substance is formed by damaged tissues, although such a substance has never been isolated or demonstrated in the blood of shocked animals. It seems unnecessary to assume the existence of such a factor, since anoxia in itself causes an increase in capillary permeability (Landis, 1928), and a failure of circulation initiated by fluid loss from the burned areas may be increased progressively by leakage of fluid from the capillaries in other parts of the body which are suffering from stagnation anoxia; in conformity with

this hypothesis is the very striking improvement which may be produced in shocked patients by administering oxygen in high concentration with the B.L.B. mask.

Therapeutic Considerations

The general management and surgical treatment of burns have been reviewed by Cohen (1940). With the exception of the use of routine prophylactic chemotherapy we are in substantial agreement with the scheme of treatment there proposed; and our therapeutic suggestions may be limited to the indications for the use and dosage of plasma or serum.

The period during which patients with burns are in jeopardy from shock extends for some forty-eight or seventy-two hours after the incident. There is at present no proved method of diminishing the pathologically increased capillary permeability, which is the fundamental lesion in shock, although pituitrin and the administration of high concentrations of oxygen are indicated for controlled trial. In the absence of a direct method of improving capillary tone the object of treatment is to maintain an adequate blood volume by replacing the protein and fluid which are lost; in this way circulation can be maintained during the forty-eight- or seventy-two-hour danger period, in which exudation from the burnt area is at its height; the maintenance of an adequate circulation prevents the onset of irreversible tissue changes such as are seen when fluid therapy is inadequate or when the burn is so extensive that the loss of fluid outruns any possible replacement. Since shock is an ingravescent condition plasma should be given early, before general circulatory changes have had time to occur.

The translation of the indications for plasma or serum therapy into clinical idiom is rendered difficult by the inconstant relation between fall in blood volume (which constitutes the fundamental indication for plasma) and the usual clinical data such as pulse rate and blood pressure. Rise in pulse rate above 100 and any fall in blood pressure are indeed indications for plasma transfusion, but cases occur which show no alteration in blood pressure and no great rise in pulse rate, yet are in the early stages of progressive shock: by the time alterations have occurred in blood pressure such cases may be unable to recover, or may require very large doses of plasma where a smaller dose given an hour or two earlier would have sufficed. Routine blood-volume estimations are impracticable, but in patients who have not bled the determination of haemoglobin, one of the simplest laboratory procedures, offers a very sensitive measure of the amount of plasma lost. For approximate calculation of the deficit in plasma volume one is justified in assuming a haemoglobin percentage of 100 and a blood volume of 5 litres, of which 3 litres are plasma. The increased haemoglobin value observed bears the same ratio to the initial value as the initial value for blood volume does to the new blood volume, since the red cell volume remains unchanged. This may be expressed in the formula $\frac{Hb_2}{Hb_1}=\frac{BV_1}{BV_2}$ or, substituting the assumed values, $\frac{Hb_2}{100}=\frac{5}{(5-x)}$, where Hb_2 is the observed haemoglobin value after the burn, and x is the amount of plasma lost. It will be seen that x can easily be calculated if Hb_2 is known. For convenience Table II gives the approximate deficit of plasma volume corresponding to a series of haemoglobin readings. This method can of course be applied only to patients who were in good health before the burn and in whom the injury causing the burn did not also cause significant haemorrhage; but this category comprises the majority of patients with burns. In addition to the deficit of plasma volume as calculated from the haemoglobin one must consider the extent and severity of the burn before deciding to give plasma; this is necessary because a similar degree of haemoconcentration may be present in a comparatively trivial injury (e.g., Case 6), as in the earlier stages of a dangerous burn. Patients who show a haemoconcentration of over 10%, and in whom the burn involves an area equal to one limb or greater, should be given plasma or serum.

TABLE II.—*Estimation of Plasma Volume Reduction. (The figures in the last three columns are derived from the haemoglobin reading by the method described in the text.)*

Haemoglobin % (Haldane)	Blood Volume (litres)	Plasma Volume (litres)	Estimated Deficit in Plasma Volume (c.cm.)
100	5.0	3.0	—
105	4.75	2.75	250
110	4.55	2.55	450
115	4.35	2.35	650
120	4.15	2.15	850
125	4.0	2.0	1,000
130	3.85	1.85	1,150
135	3.7	1.7	1,300
140	3.55	1.55	1,450
145	3.45	1.45	1,550
150	3.35	1.35	1,650

As Best and Solandt (1940) have emphasized, there is no essential difference between plasma and serum protein in therapeutics; the difference in our series was one of concentration, since we used serum in fourfold strength and plasma at half-strength. Fourfold serum was introduced into the treatment of shock in the hope that it would bring about a return of fluid from the tissues into the blood stream; we have found no evidence that this occurs in burn shock, and on two occasions injections of concentrated serum had to be supplemented after an interval of some hours by citrated plasma before blood volume was restored; the third patient to whom concentrated serum was given died.

In patients with shock an overdose of fluid is as dangerous as an underdose, though the danger is less with protein-containing infusions than with saline solutions, which should not be used. To avoid this danger it is recommended that the approximate deficit in the plasma volume should be calculated on admission by the method described above, and that the same amount of citrated plasma should be given intravenously while preparations are made for cleansing the burned area; there is little risk in giving fluid rapidly to a patient whose blood volume is acutely depleted. After the cleansing of the burns the haemoglobin estimation should be repeated, and if haemoconcentration exceeds 10% a further appropriate amount of plasma should be given. In the average case of extensive burns this means that a litre of plasma should be given pre-operatively or during the cleansing of the burns, while after operation as much as two or three litres may be required; such an amount is best given by cannula at a drip speed of about 100 per minute. Even if the plasma deficit has been calculated it is necessary to examine the patient every few hours during the second infusion to prevent overdosage with fluid. Engorgement of the neck veins is a valuable sign that too much fluid is being given; the appearance of peripheral oedema is of less value as it is a late sign, and visceral oedema may be extensive in the complete absence of "clinical oedema." In any event, the intravenous drip should not be maintained for more than one or at most two days after the burn, since by then it should be possible to give enough fluid by mouth and also the danger of death from shock is diminishing, while the risk of pneumonia, which is aggravated by pulmonary oedema, is becoming more imminent. Patients with burns, like other patients with distorted water metabolism, should have records kept of the fluid

balance, and the amount of fluid given by mouth should be regulated on this basis.

Protocols of Patients

Case 1.—This patient, a man aged 24, was admitted after being caught in the flame of a burning aeroplane. Tannafax had already been applied to the burns, which were of third degree and involved both legs from ankle to thigh, both hands and wrists, and the scalp from the lower jaw level upwards. The burns were cleaned and coagulated with 20% tannic acid. Shock was severe, the veins being very collapsed. Plasma infusion in this case was combined with the prophylactic use of sulphapyridine, 1 ampoule four-hourly. Recovery from the shock syndrome was good, but jaundice became very pronounced, and death occurred on March 17, with a definite terminal pneumonia. This experience confirmed some previous scruples as to the value of sulphapyridine when used prophylactically in cases of this type, and it was decided that in future chemotherapy should not be begun until there were definite signs of pneumonia.

Date and Time	Pulse	B.P.	Haematocrit	Haemoglobin	R.B.C. (millions)	Protein	Albumin	Chloride	Bicarbonate	Urea
12/3/40 17.30	110	90/60	57	116	6.2	4.2	2.8	726	44	26
Plasma infusion (1,600 c.cm.) from 17.30, 12/3/40, to 5.00, 13/3/40										
23.30 13/3/30	140	116/94								
22.00 14/3/40	110	—	52	114 122	6.2	3.8	—	600	52	30
15/3/40	144	110/90	41	98	5.3	—	—	548	56	35
16/3/40	142									
17/3/40	150	100/70								

Died, with respiration rate of 50 and signs of consolidation. Permission for necropsy could not be obtained.

Case 2 (Time of burn, 12/4/40, 6 a.m.).—A woman aged 57 was admitted on April 12, 1940, after sustaining burns of second degree involving the whole of the back and the right arm, when her nightdress caught fire. On first admission, four hours after the burn, she was little shocked, with B.P. 135/90 and pulse 106. After cleaning and spraying the burns with tannic acid 5% the systolic B.P. was 90. The stage of shock lasted for seventy-two hours.

Date and Time	Pulse	B.P.	Haematocrit	Haemoglobin	R.B.C. (millions)	Protein	Albumin	Chloride	Bicarbonate	Urea
12/4/40										
10.00	106	135/90								
11.30	100	90/—								
14.00	80	—	54	106	5.5	8.0	4.8	580	56	36
18.00	90	80/40								
150 c.cm. of four times normal serum from 18.15 to 18.30										
18.30	90	120/80								
500 c.cm. of citrated plasma from 18.30 to 20.30										
22.00	80	110/70								
13/4/40										
10.00	100	115/70	51	104	5.7	6.5	4.0	534	63	37
19.00	96	118/80								
14/4/40	100	110/70		99						
15/4/40	104	130/85	50	89	5.7	7.0	4.0	513	59	54
16/4/40	102	—		86	4.4					
23/4/40	80		43	84	5.2	5.0	3.0	586	62	52
7/5/40			39	84	4.8	5.8	3.8	550	50	20

Case 3.—This patient, a pilot officer aged 24, was admitted after a crash, with second- and third-degree burns involving the whole of the face and both hands, and about half the skin surface of the legs. He had had morphine grain 3/4 and 1.5 pints of normal saline at the R.A.F. station. He was severely shocked, with a pulse rate of 150 and B.P. 96/58. While the burns were being cleaned and tanned 300 c.cm. of four times normal serum was injected by syringe. This was followed by considerable improvement in the general signs of shock; on the next day a further infusion of citrated plasma had to be given. By the following day the signs of severe shock had disappeared. Healing of the burns was good, and the patient was discharged.

Date and Time	Pulse	B.P.	Haemoglobin	R.B.C. (millions)	Urea	Protein	Albumin	Chloride	Bicarbonate	Plasma Vol.	Haematocrit	Blood Vol.	Na	K
10/6/40														
5.00	156	96/58												
5.45	156	—	100	5.0	30	7.3	6.0	560	53	2.5	47.5	4.8	270	21
300 c.cm. of four times normal serum from 6.00 to 6.30														
7.00	100	90/50												
7.30	96	100/60												
11.30	90	—	112	5.7	33	7.5	6.0	—	—	2.6	46.5	4.9	305	18
15.00	78	150/90												
11/6/40														
11.00	100	114/70	122	6.0	33	6.0	4.4	595	54	2.0	57	4.6	—	—
1,500 c.cm. of citrated plasma from 14.00 to 15.00														
15.00	100	150/80												
23.00	86													
12/6/40														
10.00	80	140/90	114	5.6	38	6.0	4.4	—	—	—	53	—	282	—
13/6/40	92	140/94	118	5.3	41	6.0	4.8	560	52	—	51	—	—	26
14/6/40	—	—	100	5.0	35	5.5	4.4	570	56	—	44	—		
18/6/40	86	155/90	98	5.0	24	5.8	4.2	—	—	—	33	—	298	15
22/7/40	86	118/80	102	5.4	24	7.8	4.6	540	67	2.7	45	4.9	307	16

Case 4 (Time of burn, 25/6/40, 7 p.m.).—This patient, a woman aged 61, was admitted on June 25, 1940, from a mental institution, where she had set fire to her clothes, sustaining second-degree burns of more than half of the body surface. She was very shocked on admission, and the infusion of 300 c.cm. of four times normal serum produced only a transient improvement. The burns were cleaned and tanned, but she died on the morning after admission. Blood pressure could not be taken.

Date and Time	Haemoglobin	R.B.C. (millions)	Haematocrit	Urea	Chloride	Bicarbonate	Protein	Albumin	Pulse
25/6/40									
22.00 ..	106	—	52	32	—	34	5.8	4.0	130
26/6/40									
10.00 ..	132	6.8	59	60	641	43	6.3	4.2	135
13.00 Died									

At necropsy, carried out by Dr. A. H. T. Robb-Smith, extensive oedema of the subcutaneous tissue in relation to the burnt areas was seen. A small pleural effusion was present on both sides, and the lungs were congested and oedematous. A fresh preparation showed occasional fat embolism in the pulmonary vessels. A few endocardial haemorrhages were found. The liver was congested and fatty, the spleen pale and contracted. The suprarenal cortex contained abundant lipoid.

Case 5.—A man aged 25 was admitted, after an aeroplane crash, with third-degree burns of the face and hands. First dressing with tannafax was left on for five days, after which the hands were treated by coagulation with gentian violet and extension on a racket splint. On admission the patient was moderately shocked, with some collapse of superficial veins. Definite lowering of blood pressure persisted for forty-eight hours and oedema in relation to the burnt areas for seven days.

Date and Time	Pulse	B.P.	Haemoglobin	R.B.C. (millions)	Urea	Protein	Albumin	Chloride	Bicarbonate	Plasma Vol.	Haematocrit	Blood Vol.	K	Na
4/7/40														
16.30	90	106/92	136	6.5	65	5.0	4.0	569	50	1.5	66	4.5	27	—
Plasma infusion (2,000 c.cm.) from 22.00, 4/7/40, to 13.00, 5/7/40														
5/7/40														
16.30	90	104/74	116	5.3	40	5.5	4.2	571	49	3.0	51	5.9	23	337
6/7/40	100	130/80	116	5.1	39	5.5	3.8	532	50	—	47	—	23	—
7/7/40	95	134/60												
8/7/40	80	120/80	100	4.3	35	5.0	3.0	572	50	—	44	—	—	—
5/9/40	80	—	92	4.5	25	6.0	3.6	572	50	2.7	41	4.6	—	—
9/10/40													17	356

Case 6 (Time of burn, 23/9/40, 9 a.m.).—This patient, a woman aged 27, was admitted with a scald of the face and right arm, of the first degree. Although she was in considerable pain, shock was very slight, and she was discharged on September 24, the day after admission. She is of interest in showing slight but definite haemoconcentration in the absence of other blood changes, and of any increase in pulse rate or decline in blood pressure.

Date and Time	Haemoglobin	R.B.C. (millions)	Plasma Vol.	Haematocrit	Blood Vol.	Urea	Protein	Albumin	Chloride	Bicarbonate	K	Pulse	B.P.
23/9/40 10.00	108	5.6	3.0	47	5.6	32	6.5	4.5	589	61	21	80	124/82
24/9/40 10.00	98	—	—	43	—	44	6.5	4.4	597	56	—	80	—

Case 7 (Time of burn, 5/10/40, 5 a.m.).—This patient, a woman aged 58, was admitted on October 4, 1940, with second-degree burns of the lower part of the back, and the back and sides of both legs. These were cleaned and tanned with 10% tannic acid and silver nitrate. She was treated by the infusion of 1,500 c.cm. of citrated plasma and by oxygen administration by the B.L.B. mask. The condition of shock lasted for less than forty-eight hours. She left hospital against advice on October 9.

Date and Time	Pulse	B.P.	Haemoglobin	R.B.C. (millions)	Haematocrit	Urea	Protein	Albumin	K
5/10/40 11.00	96	—	140	7.5	65	30	5.5	—	24
13.00 to 23.00 : 1,500 c.cm. of citrated plasma (B.P. at 23.00, 140/80)									
7/10/40 10.00	110	140/80	116	5.5	55	80	6.5	3.8	22
8/10/40	90		114						

Case 8.—This patient, a man aged 26, was admitted three hours after an aeroplane crash in which he sustained severe burns of head, trunk, and limbs covering more than half of the body surface. Very shocked on admission, pale and sweating. 1,200 c.cm. of citrated plasma was run in rapidly, after venespasm had been overcome by heat and pressure with a Higginson syringe. The burns were cleaned and coagulated in theatre, and the plasma drip was continued till 3,500 c.cm. in all had been given. He had then lost all signs of shock, but his temperature was 104° F. and his pulse 134, and he appeared to be suffering from toxaemia. Calcium gluconate was given in a dose of 4 grammes intramuscularly. On the next day his condition was worse, and his respirations had increased to 40, although there were no abnormal signs in the chest. He vomited bilious fluid several times before death. Owing to the extent of the arm injuries blood pressure and volume could not be estimated, and blood was obtained from the femoral vein.

Date and Time	Pulse	Haemoglobin	Haematocrit	R.B.C. (millions)	Protein	Albumin	Chloride	Bicarbonate	Urea	Sodium	Potassium	Blood Sugar (mg. per 100 c.cm.)	Bilirubin
21/10/40 23.30	186	132											
Plasma infusion from 23.45, 21/10/40, to 12.00, 22/10/40 (3,500 c.cm.)													
22/10/40 9.00	132	92		5.2	(W.B.C. 64,000)								
11.00	130	98	42	5.0	4.5	4.2	656	52	120	280	10.2	—	—
23/10/40 10.00	136	102	45	5.0	4.8	2.8	592	49	132	—	—	141	0.2

(The plasma in both venous samples contained haemoglobin and methaemoglobin, but no methaemalbumin. The urine contained haemoglobin and red cells; the patient's group was O (IV), while the plasma used was A (II), so that the patient's cells would not be agglutinated from this cause. Urobilin was also present in the urine, but no excess of urobilinogen.)

Necropsy was done by Dr. Robb-Smith at 16.30, 23/10/40, five hours after death. Oedema was limited to the neighbourhood of the burnt areas, which showed no evidence of sepsis. A few petechial haemorrhages were present on the lining of serous cavities, but there were no endocardial haemorrhages such as are found in patients dying of shock. The heart muscle was good, although there was right-sided dilatation. The lungs showed haemorrhagic areas, such as might be produced by concussion injury; some fat embolism was present. The spleen was large and congested, and the liver capillaries contained masses of packed red cells. The kidneys had "haemoglobin casts" in the tubules. The necropsy findings were not those to be expected had death been caused by shock or excessive fluid administration; the organic changes were compatible with death being caused by a combination of renal damage and traumatic injury to the lung.

NOTE.—Throughout the protocols haemoglobin results are expressed as percentage Haldane, red cells as millions per c.mm., haematocrit as per cent., blood and plasma volume as litres, urea as mg. per 100 c.cm. of blood, protein as grammes per 100 c.cm. of plasma, and sodium, potassium, chloride, and bicarbonate as mg. per 100 c.cm. of plasma.

Summary

Clinical, haematological, and biochemical observations have been made on eight patients with burns or scalds, of whom seven were treated with plasma or serum. In patients before treatment the main findings were:

(*a*) Increasing shock, with the classical symptomatology.

(*b*) Progressive haemoconcentration.

(*c*) A fall in the plasma volume, and therefore in the total amount of plasma protein, although the protein concentration was often quite high. Evidence was obtained that amounts of plasma protein equivalent to a quarter of the total plasma protein might be lost in a few hours.

(*d*) Plasma chloride was high and bicarbonate low, while blood urea was normal.

(*e*) Serum sodium was low and there was a slight rise in serum potassium.

Great clinical improvement followed infusion of dilute plasma and was accompanied by a rise in plasma volume in those cases in which serial observations of blood volume were possible. The results with four times normal serum were much less favourable; one of the three patients treated with concentrated serum died, and the other two required an infusion of dilute plasma later.

A scheme is put forward for calculating the approximate dosage of plasma required, using the observed haemoglobin figure as a basis.

I am indebted to Dr. A. N. Drury for a supply of dried serum, and to Prof. L. J. Witts for directing the investigation and criticizing the paper.

REFERENCES

Archer, H. E., and Robb, G. D. (1925). *Quart. J. Med.*, **18**, 274.
Bence, J. (1906). *Z. klin. Med.*, **58**, 203.
Best, C. H., and Solandt, D. Y. (1940). *British Medical Journal*, **2**, 116.
Cohen, S. M. (1940). Ibid., **2**, 251.
Elkinton, J. R. (1939). *Bull. Ayer clin. Lab.*, **3**, 279.
Harrison, G. A. (1937). *Chemical Methods in Clinical Medicine*, London.
Keith, N. M., Rowntree, L. G., and Geraghty, J. T. (1915). *Arch. intern. Med.*, **16**, 547.
Landis, E. M. (1928). *Amer. J. Physiol.*, **83**, 528.
Moon, V. H. (1938). *Shock and Related Capillary Phenomena*, New York and London.
—— (1939). *Ann. Surg.*, **110**, 260.
Peters, J. P., and van Slyke, D. D. (1931). *Quantitative Clinical Chemistry*, Baltimore.
Robb-Smith, A. H. T. (1940). Personal communication: to be published.
Scudder, J. (1940). *Shock: Blood Studies as a Guide to Therapy*, Philadelphia.
Trusler, H. M., Egbert, H. L., and Williams, H. S. (1940). *J. Amer. med. Ass.*, **113**, 2207.
Underhill, F. P., Carrington, G. L., Kapsinow, R., and Pack, G. T. (1923). *Arch. intern. Med.*, **32**, 31.
Van Slyke, D. D. (1917). *J. biol. Chem.*, **30**, 347.
Whipple, G. H. (1938). *Amer. J. med. Sci.*, **196**, 609.
Wilson, W. C., and Stewart, C. P. (1939). *Trans. med.-chir. Soc. Edinb.*, **53**, 153.

The Argentine Republic has 11,244 practitioners, or one doctor to every 1,485 inhabitants, of whom 5,077 live in Buenos Aires, with the result that some districts are badly provided with doctors.

JAUNDICE IN LEUCO-ERYTHROBLASTIC ANAEMIA

BY

J. MacDONALD HOLMES, M.D., M.R.C.P.

Physician, Staffordshire General Infirmary

AND

A. J. McCALL, M.D., M.R.C.P.

Assistant Pathologist, Staffordshire County Council

The occurrence of leuco-erythroblastic anaemia in carcinomatosis of the bone marrow is well recognized. The characteristics of the blood picture are the presence of nucleated red cells even when the anaemia is slight, and a variable leucocytosis in which immature myeloid cells are found. The metabolism of bile pigment has not been extensively studied in this condition, and Vaughan (1936) points out that the interpretation of the van den Bergh reaction has usually been obscured by the presence of hepatic metastases or of carcinomatous glands in the portal fissure producing obstructive jaundice. We record two cases of leuco-erythroblastic anaemia complicated by jaundice. Both were cases of cancer of the stomach with widespread metastatic dissemination. In the first case many metastases were formed in the bone marrow. In the second an incomplete examination of the skeleton was made, but the clinical and haematological features so closely resembled those of the first case as to suggest the presence of metastases in the marrow. The jaundice was of the "haemolytic" or "retention" type (Rich, 1930), and both cases were at first thought to be examples of haemolytic anaemia of the type described by Lederer (1925, 1930). This author described a syndrome in which were associated rapidly progressive anaemia with signs of active blood regeneration, jaundice, pyrexia, and a leucocytosis with immature white cells. The patient usually complained of backache, and a characteristic feature was said to be the rapid and usually permanent improvement following blood transfusion.

Case I

A married woman aged 49 was first seen by one of us (J. MacD. H.) in consultation with Dr. E. G. Sherwood on January 3, 1939. Illness had begun five weeks previously with aching pains in the back and thighs, which the patient had attributed to rheumatism. When seen by Dr. Sherwood a fortnight later there was no evident anaemia. The pains in the limbs and back became worse, and a week before consultation pyrexia appeared and remained constant at about 100° F. Pallor and jaundice also became apparent. There was nothing relevant in her previous history.

Examination.—The findings were as follows: Severe pallor and slight jaundice. Liver palpable 1½ in. below costal margin, and tender. Spleen just palpable. Tenderness on pressure of dorsal and lumbar spine. Urine dark in colour and contained a small amount of albumin; urobilin and urobilinogen present in large amounts; bilirubin and bile salts absent. Bence-Jones protein absent. A blood count gave the following figures: haemoglobin, 37% (14.5 grammes = 100%); red cells, 1,900,000; colour index, 0.97; Wintrobe's volume index, 0.97; white cells, 8,400—polymorphs 58%, lymphocytes 35%, monocytes 4%, eosinophils 0.5%, myelocytes 2.5%; icterus index, 15 units; direct van den Bergh reaction, faint biphasic; quantitative indirect reaction, 3 units; reticulocytes, 6%. Red cells showed much anisocytosis and some were hypochromic. There was polychromasia. Six normoblasts were seen in counting 200 white cells. Red cell fragility was normal; haemolysis began at 0.44% and was complete in 0.25% saline. Agglutination tests were negative to organisms of the enteric group, composite Salmonella suspension, *B. enteritidis* (Gaertner), and *Brucella abortus*.

A diagnosis of acute haemolytic anaemia was made and a blood transfusion of 250 c.cm. was given. The progress of the patient during the next few days suggested that the anaemia was of Lederer's type. The pains in the limbs and back improved, the pyrexia began to subside, and there was an increased feeling of well-being. On January 6 a second transfusion of 500 c.cm. was given. After this the pyrexia subsided completely. On the 9th the haemoglobin had risen to 60%. A few days later the patient left the nursing home, no further pyrexia having occurred. In the next three weeks her condition slowly deteriorated.

On February 3 she was admitted to the Staffordshire General Infirmary, and it was found that the anaemia was almost as severe as before: red cells 2,590,000 per c.mm., haemoglobin 49%, colour index 0.98. Radiographs of the long bones showed appearances suggestive of secondary malignant deposits. She was again jaundiced, and urobilin was present in the urine. A fractional test meal showed that a normal amount of free hydrochloric acid was present, but blood was found in all the specimens and the emptying time was slow. The significance of these observations was not recognized at the time, as there were a few purpuric haemorrhages under the skin in various places, and it was assumed that the blood was due to purpuric haemorrhage from the gastric mucosa. On February 8 and during the next two days a drip transfusion of three litres was given, the haemoglobin being raised to 74%. The blood picture slowly deteriorated after this, and although another transfusion of 500 c.cm. was given on February 23 the patient died on March 3, 1939. Blood culture was sterile on three occasions.

A feature of this case was the occurrence of crises in which the pyrexia appeared together with increased anaemia and jaundice. These findings were thought to be consistent with a diagnosis of haemolytic anaemia, and the similarity to Lederer's syndrome was emphasized by the response to the earlier transfusions.

Post-mortem Findings (Four Hours after Death).—The essential features were as follows: Multiple secondary malignant deposits in heart muscle and pericardium; an ulcer with an indurated base and nodular edge, carcinomatous in appearance and about one inch in diameter, near the pylorus; a gland from the lesser omentum invaded by growth. Spleen slightly enlarged. Both ovaries replaced by large masses of tumour. Skeletal secondary deposits present in femora, humeri, lumbar vertebrae, and sternum.

Histological Examination.—Sections from the ulcer revealed a spheroidal-celled carcinoma. Lymphatics several inches from the ulcer were permeated by growth and an omental gland examined contained secondary deposits. The heart showed diffuse invasion by malignant cells, and, in the lung, many lymphatic channels contained tumour cells. The normal structure of the ovaries was entirely obliterated by tumour cells. Marrow from the femur, humerus, and lumbar vertebrae had a similar appearance. Many of the canals between the bony trabeculae were occupied only by loose fibrillary tissue, but others were plugged with tumour cells. Islands of haemopoiesis occupied some of the spaces. The haemopoietic areas consisted largely of normoblasts and groups of haemocytoblasts. In some areas, however, there was a definite shift of haemopoiesis to the left, haemoglobinized cells with immature nuclei being seen. Proliferating white cells of the granular series were present, but were much less numerous than the erythropoietic cells. In the liver large numbers of immature red and white cells lay free within the sinusoids. Clumps of haemocytoblasts were a conspicuous feature. In many of the sinusoids cells indistinguishable from normal megakaryocytes were seen. Many Kupffer cells contained free iron, and phagocytosis of erythrocytes by Kupffer cells was frequently observed. There was a moderate degree of fatty change, of patchy distribution. No malignant deposits were present in the liver proper, but a haemangioma found in the liver was of interest in that clumps of malignant cells were seen in several of the cavernous spaces, although a careful search failed to reveal any in the surrounding liver tissue. It would seem that slowing of the blood stream had caused tumour cells to accumulate in this site. In the spleen active haemopoiesis was present throughout and occasional megakaryocytes were seen. The Malpighian bodies were greatly reduced in size. There

was some erythrophagocytosis, but this was not conspicuous. There was a good deal of free iron, usually lying in the histiocytes.

Case II

This patient, a man aged 26, was admitted to hospital on June 17, 1936. There was a history of a gastrectomy performed in another hospital fourteen months previously, but details of this were not available. When first seen by one of us (A. J. McC.) he complained of weakness and malaise. His throat was sore, and he had pains in the loins, chest, and groins. There were no other symptoms.

Examination.—He did not seem very ill and was not thought to be anaemic. There were no petechiae and no jaundice. Temperature 99.4° F., pulse rate 120. The supraclavicular and cervical glands on both sides were palpable and tender. Dental sepsis was present. The spleen and liver were not palpable. The cardiovascular and respiratory systems were normal. Spinal movements were painful. The central nervous system was normal. On June 18 bleeding from the gums and slight jaundice were noticed. Urobilin was found in the urine, but no bile pigment. On the 19th ecchymoses appeared on the legs, and on the 22nd there was definite jaundice. The patient became severely ill and was obviously anaemic. The temperature since admission had varied between 99° and 102°. A blood count gave the following results: Red cells, 1,216,000; haemoglobin, 10% approx. (14.5 grammes = 100%); colour index, 0.43 approx.; Wintrobe's volume index, 0.7; halometer reading, 7.17; reticulocytes, 30%; white cells, 32,000—neutrophils 70%, eosinophils 2%, myelocytes 2%, myeloblasts 2%, lymphocytes 21%, monocytes 3%. Eighteen normoblasts per 100 white cells were counted. Red cells showed marked anisocytosis and hypochromia. Some cells had polychromasia and basophil stippling. Fragility was normal, haemolysis beginning at 0.45% and being complete at 0.3%. The icterus index was 25 units. The direct van den Bergh reaction was negative and the blood culture sterile. Agglutination reactions against organisms of the enteric group, composite Salmonella suspension, *B. enteritidis* (Gaertner), and *Brucella abortus* were negative. Urine contained a moderate amount of albumin and urobilin in excess.

On the same day a blood transfusion of 500 c.cm. was given, without improvement, and on June 24, 1936, the patient died.

Post-mortem Findings.—Essential findings as follows: A partial gastrectomy had been performed and the stoma appeared healthy. The head and body of the pancreas were indurated, the appearance resembling chronic pancreatitis. There was no demonstrable narrowing of the common bile duct. The spleen was twice its normal size, and was firm and congested. The mediastinal glands were enlarged, but the heart was normal except for subpericardial haemorrhages. The liver was pale and slightly enlarged, and the kidneys showed subcapsular haemorrhages. With regard to the bone marrow, unfortunately only the humerus was examined, and no malignant deposits were found.

Histological Examination.—The pancreas showed invasion by spheroidal-celled carcinoma, and a mediastinal gland also revealed spheroidal-celled deposits. In the liver the cells for some distance round the central vein were poorly stained, and in some areas there was definite pericentral necrosis. Occasional nucleated red cells were seen in the sinusoids, but no definite areas of haemopoiesis were observed. There was no erythrophagocytosis by the Kupffer cells, and no free iron was demonstrable. Examination of the spleen revealed that many of the sinusoids were empty, but the pulp contained large numbers of red cells. Normoblasts were present, but no recognizable haemocytoblasts. It is difficult to be certain whether or not haemopoiesis had occurred in the spleen. A fair amount of free iron was lying in the histiocytes. No tumour cells were present in the portion of bone marrow examined.

The metastases in this case clearly originated from a cancer of the stomach for which gastrectomy had been performed. The extremely rapid development of the anaemia, together with jaundice and pyrexia, seemed to indicate that a haemolytic process was responsible.

Discussion

It appears to us that not enough evidence is available to justify the assumption that the anaemia in these cases was definitely due to excessive blood destruction. Quantitative investigations on the excretion of faecal bile pigment were unfortunately not undertaken. It also seems likely that spectroscopic examination of the blood for methaemalbumin may prove important in this type of case, since the pigment was found by Fairley (1937) to accompany the intravascular haemolysis in blackwater fever.

It has been pointed out by Whipple (1922a, 1922b), Witts (1932), and many others that the findings often considered to be evidence of excessive haemolysis—such as an increased serum bilirubin, an augmented urinary and faecal excretion of bile pigments and their derivatives, and haemosiderosis of the organs at necropsy—may indicate an inability of the erythron to utilize these products rather than an excessive destruction of blood.

Rich (1930), in his excellent discussion on the pathogenesis of jaundice, has stressed the importance of impaired liver function in producing the type of jaundice commonly referred to as "haemolytic," but which he prefers to call "retention" jaundice. He emphasizes the fact that a normal liver can excrete any quantity of bile pigment likely to result from haemolysis, and that jaundice occurs only when hepatic function is impaired as a result of the anaemia. The liver necrosis observed in our second case must certainly have been a factor in producing jaundice. A number of cases similar to ours are, however, recorded in the literature, perhaps on insufficient evidence, as examples of haemolytic anaemia in carcinomatosis of the marrow. It is of interest that in some of these cases the fragility of the red cells to saline was increased.

Seemann and Krasnopolski (1926) reported a case of cancer of the stomach with extensive bone metastases in which the features of leuco-erythroblastic and haemolytic anaemia were combined. Waugh (1936) described two similar cases. The first did not come to necropsy, but radiological examination of the spine suggested vertebral metastases: the red cell fragility was increased. Waugh's second case was one of primary carcinoma of the breast with marrow secondaries. In the case recorded by Kiser and Rosenak (1936) the marrow was not examined. A case described by Caroli and Lavergne (1937) was very similar to ours. Eight months before the onset of the anaemia a gastrectomy had been performed for cancer of the stomach. Fever, jaundice, and urobilinuria were present. The red cell fragility was increased. More recently Lucey (1939) has recorded a case of bronchogenic carcinoma with leuco-erythroblastic anaemia and increased red cell fragility.

It is evident that a syndrome may occur in association with skeletal carcinomatosis which resembles clinically the "acute haemolytic anaemia" of Lederer. The wider recognition of this syndrome is desirable.

Whether or not the anaemia in these cases can be attributed to excessive haemolysis seems uncertain. In none of them does it appear that sufficient evidence, based on modern criteria, has been presented to support this view definitely. The finding of increased saline fragility of the red cells in some of the cases lends colour to the suggestion that a haemolytic process is responsible. It does appear quite certain that carcinomatous deposits in the marrow may cause increased fragility of the red cells. In this connexion two cases of leuco-erythroblastic anaemia occurring in myelosclerosis recently described by Vaughan and Harrison (1939) are of interest. In both

cases the red cell fragility was increased but the serum bilirubin was within normal limits.

In our cases a quantitative method of estimating the fragility (for example, Simmel, 1923) was not employed, but it is unlikely that there was any notable increase. Fragility to saline is, however, rather an artificial measure of the red cells' destructibility in the body. It is conceivable that the presence of metastases in the marrow may so upset the metabolism of the haemopoietic tissue as to render the cells abnormally susceptible to phagocytosis by the reticulo-endothelial system. This change might not necessarily be reflected in any increased fragility with *in vitro* tests. Erythrophagocytosis was in fact a conspicuous feature in our first case, but was not observed in the second.

In those cases in which the primary growth was in the stomach the importance of the loss of intrinsic factor is of interest. It is noteworthy, therefore, that these cases have not been examples of megalocytic anaemia, and of the two here described the first was normocytic and the second microcytic and hypochromic.

"*Haemolytic Anaemia*" *in Other Infiltrative Conditions of Bone.*—It appeared of interest to consider the frequency of the occurrence of a similar syndrome in infiltrative conditions of bone other than carcinoma. A number of cases of Hodgkin's disease presenting features resembling those of the cases noted above are on record. Singer (1936) reviews eleven cases with one of his own. These eleven cases were reported by Holler and Paschkis (1927), two cases; Davidson (1932), three cases; Heilmeyer (1932), one case; Gripwall (1932) and Bergqvist and Gripwall (1935), one case; Dalous and Fabre (1933), one case; Bensis and Gouttas (1934), one case; Parkes Weber and Schwarz (1934), one case; and Horak (1934), one case. Von Braitenburg (1938) recorded a case which was remarkable in that, although lymphadenomatous deposits were confined to the mesenteric and mediastinal glands, a severe haemolytic type of anaemia developed. Only in four of the thirteen cases quoted were osseous deposits of lymphadenoma found, but the examination of the skeleton was not always complete. The red cell fragility was not estimated in every case, but in four it was found to be slightly increased. We have been unable to find any record of "haemolytic anaemia" occurring in myelomatosis, Hand–Schuller–Christian's disease, Gaucher's disease, or Niemann–Pick's disease. In leukaemia, however, cases complicated by the type of jaundice in question are occasionally seen. This again is a condition in which there is widespread infiltration of the marrow.

Extramedullary Megakaryocytosis.—In Case I haemopoietic tissue was observed in the liver and spleen; this is, of course, not uncommon with widespread marrow destruction. The occurrence of extramedullary megakaryocytosis in carcinomatosis is, however, infrequent. Vaughan and Harrison (1939) give an exhaustive bibliography on megakaryocytic myelosis and related conditions.

Summary

Two cases of leuco-erythroblastic anaemia complicated by jaundice are described. The jaundice was of the "haemolytic" or "retention" type, and the clinical picture corresponded in many respects with Lederer's syndrome. The first case had extensive carcinomatous deposits in the skeleton, and it seems likely that bone metastases were present in the second case. The primary growth had its origin in the stomach in both cases. In both the fragility of the red cells was normal.

Records of similar cases, in some of which the fragility was increased, are reviewed, and the occurrence of a similar syndrome in other forms of generalized bone disease is discussed.

Cases of skeletal carcinomatosis in which leuco-erythroblastic anaemia is complicated by "retention" jaundice are likely to be diagnosed as "Lederer's anaemia." Radiographs of the skeleton should be taken in cases presenting the features of haemolytic anaemia of doubtful origin, and a careful search should be made for any focus of malignant disease.

There is not enough evidence definitely to attribute the anaemia and jaundice in these cases to a haemolytic process, but it is possible that such a process is responsible.

Our thanks are due to Dr. E. G. Sherwood for supplying the early history of the first case and to Dr. H. H. MacWilliam of Walton Hospital, Liverpool, for access to the records of the second case and for permission to publish it. We are indebted to Professors J. H. Dible and T. F. Hewer for advice, and to Dr. J. Menton for help and laboratory facilities.

References

Bensis, V., and Gouttas, A. (1934). *Sang*, **8**, 288.
Bergqvist, B., and Gripwall, E. (1935). *Acta path. microbiol. scand.*, **12**, 79.
Braitenburg, H. von (1938). *Frankfurt. Z. Path.*, **51**, 515.
Caroli, J., and Lavergne, H. (1937). *Bull. Mém. Soc. méd. Hôp. Paris*, **53**, 1056.
Dalous and Fabre, J. (1933). *Paris méd.*, **2**, 39.
Davidson, L. S. P. (1932). *Quart. J. Med.*, **25**, 542.
Fairley, N. H. (1937). *Festschrift Bernhard Nocht*, Hamburg.
Gripwall, E. (1932). *Acta med. scand.*, **79**, 489.
Heilmeyer, L. (1932). *Dtsch. Arch. klin. Med.*, **172**, 628.
Holler, G., and Paschkis, K. (1927). *Wien. Arch. inn. Med.*, **14**, 149.
Horak, J. (1934). *Casop lék. cesk.*, **73**, 628; abst. in *Sang*, 1935, **9**, 642.
Kiser, E. F., and Rosenak, B. D. (1936). *J. Amer. med. Ass.*, **107**, 963.
Lederer, M. (1925). *Amer. J. med. Sci.*, **170**, 500.
—— (1930). Ibid., **179**, 228.
Lucey, H. C. (1939). *Lancet*, **2**, 76.
Rich, A. R. (1930). *Johns Hopk. Hosp. Bull.*, **47**, 338.
Seemann, G., and Krasnopolski, A. (1926). *Virchows Arch.*, **262**, 697.
Simmel, H. (1923). *Dtsch. Arch. klin. Med.*, **142**, 252.
Singer, K. (1936). *Med. Klinik*, **32**, 179.
Vaughan, J. M. (1936). *The Anaemias*, Oxf. Univ. Press, London.
—— and Harrison, C. V. (1939). *J. Path. Bact.*, **48**, 339.
Waugh, T. R. (1936). *Amer. J. med. Sci.*, **191**, 160.
Weber, F. Parkes, and Schwarz, E. (1934). *Lancet*, **1**, 680.
Whipple, G. H. (1922a). *Arch. intern. Med.*, **29**, 711.
—— (1922b). *Physiol. Rev.*, **2**, 440.
Witts, L. J. (1932). *Lancet*, **1**, 495, 549, 601, 653.

PENETRATING BAYONET WOUND OF THE PERINEUM

A CASE WITH INTERESTING COMPLICATIONS

BY

J. S. HORN, M.B., F.R.C.S.

The following case may be considered of interest owing to its stormy history due to complications.

History of Case

The patient, a corporal in the R.A.F., aged 23, was admitted at 4.30 a.m. on July 5, 1940, having jumped off a barrage-balloon winch in the darkness and landed on the point of a bayonet, which was fixed to a rifle standing beside the winch. He experienced immediate severe abdominal pain, vomited once, and complained of a desire to pass urine but inability to do so.

On examination he was very shocked. The pulse was 120 and thready; there was generalized abdominal rigidity; and a wound an inch long was present on the medial aspect of the left thigh, passing up over the adductor longus. No blood could be milked from the external urinary meatus, and rectal examination revealed nothing abnormal. A pint of whole blood was given intravenously, and an hour later his abdomen was opened under gas-and-oxygen anaesthesia by an infra-umbilical mid-line incision.

There was a considerable amount of free blood in the peritoneal cavity and a rent about an inch in length was found in the fundus of the bladder. This rent was closed with catgut sutures and the suture line then oversewn. The peritoneum on the anterior surface of the rectum was gashed, but the muscular coat was intact. The point of the bayonet had entered the mesentery of a loop of ileum about three feet from the caecum and had ripped up the mesentery as far as the gut, the mesenteric aspect of which had been perforated. Bleeding-points in the torn mesentery were secured and the gap was sutured. The perforation in the ileum was closed and the affected segment of intestine wrapped in a

warm saline pad. When re-examined a few minutes later its colour had improved, but since it was not quite normal the doubtful area was invaginated with interrupted Lembert sutures. The patient's condition at this stage did not permit of exploration of the bladder, and so a catheter was passed per urethram and tied in. The wound in the thigh was enlarged, its skin edges were excised, and it was packed in its whole length with flavine gauze.

The following day, in spite of repeated hot bladder wash-outs with 1 in 1,000 silver nitrate, bleeding into the bladder was still occurring. He was therefore again taken to the theatre, and his bladder was opened through the lower end of the original incision. A gash was found in the neck of the bladder involving the internal meatus and bleeding freely. Two catgut sutures were tied round the gash, but since no boomerang needle was available it was impossible to control the bleeding from that part of the wound within the internal meatus. Accordingly the neck of the bladder was packed with ribbon gauze, the end of which was brought out alongside a large suprapubic catheter, around which the bladder was closed. This controlled the bleeding, and when the pack was removed twenty-four hours later bladder wash-outs were only slightly blood-stained.

Acute Gastric Dilatation: Protein Shock

Thirty-six hours after the last operation the patient's condition began to deteriorate rapidly. His pulse went up to 140, his colour was poor, and he vomited almost two pints of foul brown fluid. He was very drowsy, and a blood-urea estimation at this stage showed 98 mg. per 100 c.cm. He complained of slight epigastric pain, which was continuous in character. His abdomen was free from rigidity, peristaltic sounds were normal, and there was some distension in the epigastrium. During the next six hours he vomited frequently and copiously, his pulse continued to rise, and the epigastric distension became more obvious. A splash could be elicited from his epigastrium. A diagnosis of acute gastric dilatation was made, a Miller-Abbott tube was passed into his stomach through the nose, and he was placed in the semi-prone position with the foot of the bed raised. Continuous siphonage was instituted through the Miller-Abbott tube and the patient was given a continuous intravenous drip of 5% glucose saline.

During the next seven days his condition slowly improved, siphonage of the stomach and the intravenous drip being continued all the time. Between four and five pints of brown fluid was aspirated from his stomach daily, and a careful balance was maintained between fluid lost in this way and in the urine and the amount given in the intravenous drip. At the end of this time, when he had sufficiently improved for the removal of the gastric tube to be considered, he suddenly had a rigor and his pulse shot up to 140. The intravenous saline was discontinued and he was given morphine. The next day his pulse had come down to 100, but his sclera and urine were definitely stained with bile pigments. A van den Bergh test gave an indirect delayed positive reaction and the plasma bilirubin was 4 mg. (8 units) per 100 c.cm. It was later ascertained that he had been inadvertently given a bottle of saline that had been opened some three days previously, and this complication, from which he soon recovered, was considered to be due to protein shock from impure saline. The Miller-Abbott tube was now removed, but the patient was kept in the semi-prone position for a further three days. No further vomiting occurred. Rectal salines were given twice daily.

Since during the time the Miller-Abbott tube had been in place he had been losing some four to five pints of gastric contents daily it was thought it would be profitable to ascertain the protein content of the fluid lost, so that we might anticipate symptoms of plasma-protein depletion such as famine oedema. This was accordingly done, and was found to be only 0.2%, a quantity which was considered insufficient to give rise to trouble in this direction.

Volvulus of Small Intestine

On September 9, when the patient was progressing very well, the last and most serious complication ensued. At 10 p.m. the patient was suddenly seized with severe continuous abdominal pain; he vomited once and became very collapsed. A rapidly progressing central abdominal distension supervened, most marked below the umbilicus, and the patient continued to vomit. An enema yielded a poor faecal result and a second enema was returned clear.

In view of the continuous nature of the pain, which was taken to indicate stretching of the mesentery, and the very rapid distension, a diagnosis of volvulus was made, and the abdomen was opened by a left pararectal incision under local anaesthesia supplemented by gas-and-oxygen. There was a little free fluid in the peritoneal cavity, and enormously distended coils of small intestine prolapsed through the wound. The peritoneal covering was dull and shaggy with fibrin, and there were numerous subserous ecchymoses. The distension extended up to the duodeno-jejunal flexure and down to within a few feet of the ileo-caecal junction.

A strong band consisting chiefly of omentum was found to be attached to the posterior abdominal wall on the left side. When this was divided there was found to be a volvulus of the greater part of the small intestine, which had passed between this band and the posterior abdominal wall. The volvulus spontaneously resolved itself when the band was divided and the released gut began straightway to show peristalsis. A No. 12 Jacques catheter was sewn into a distended coil of jejunum by Witzel's method and a large quantity of intestinal contents withdrawn. The wound was then closed and the catheter brought out on to the surface. A stomach tube was passed, and this was retained for two days, after which time the patient's condition had greatly improved. The enterostomy catheter was withdrawn six days later and the fistula healed within three days.

Apart from a severe alkaline cystitis and urethritis, which yielded to irrigations with 1% acetic acid in 1 in 10,000 flavine, the patient had no further mishaps and his cystotomy closed about six weeks after admission. On discharge his blood urea was 31 mg. per 100 c.cm. and his haemoglobin 105%.

I would like to stress the value of the Miller-Abbott tube in the treatment of acute gastric dilatation and in paralytic ileus. Its length makes really continuous siphonage a possibility, and its double channel greatly facilitates irrigation.

Summary

A case of bayonet wound of the thigh passing through the perineum and bladder and involving the mesentery and small intestine is described.

The supervention of the complications of acute gastric dilatation, protein shock from impure saline, and volvulus of the small intestine is likewise described.

The value of the Miller-Abbott tube is stressed.

V. Mittler (*Thèse de Paris*, 1940, No. 234), who records three illustrative cases, states that contrary to what might be supposed the clientele of quacks is not entirely composed of psychopathic individuals, but consists in large measure of normal or apparently normal persons. Three groups of quacks may be described. The first consists of mere swindlers who belong to the psychiatric group of Lombroso's criminal mass, in whom delinquency is a proof of mental deficiency. The second group consists of apparently normal persons in whom a curative power appears to exist and gradually develops into psychopathy, while the third group is composed of psychopathic persons who have a belief in an altruistic mission with the possible intervention of divine inspiration. The first group comes within the domain of criminal law, the third is the concern of a mental hospital, while the patients in the second group should be interned for a sufficiently long period for a prolonged examination to be made. Mittler maintains that education of the public will never result in a reduction in the number of quacks, as the taste for the marvellous is too deeply implanted in their mentality for a Press campaign, however well organized, to annihilate it.

TREATMENT OF BURNS BY SILVER NITRATE, TANNIC ACID, AND GENTIAN VIOLET

BY

JAMES A. ROSS, F.R.C.S.Ed.
Captain, R.A.M.C.

AND

K. F. HULBERT, M.B., B.S., D.A.
Lieutenant, R.A.M.C.

The following clinical notes, though short and incomplete, may prove of interest in view of the demand for information on experience of surgery in the present war.

During recent air battles five seriously burnt airmen were admitted under our care, four within eight hours of their injury and one after forty-eight hours. These burns, though not so extensive as those seen by one of us (J. A. R.) during the evacuation from Flanders, were serious enough to warrant careful attention, and are the type likely to be met with in the future. The treatment adopted in each case closely followed the routine advocated by Dennison (1939), and it is to emphasize the excellent results obtainable by this method that these cases are described.

Case Histories

Case 1.—Pilot officer aged 27. Petrol burns of the second degree involving the forehead, nose, and complete right half of the face, the dorsum of the right hand and forearm halfway to the elbow, and the right calf for the middle three inches in its complete circumference. After the preliminary anti-shock treatment with morphine, hot sweet tea, and warming up under an improvised shock cage, atropine grain 1/100 was administered and the patient was taken to the theatre. Pentothal sodium anaesthesia was used, a total of 25 c.cm. being given over a period of half an hour. The burnt areas were scrupulously but gently cleansed with swabs soaked in ether soap, followed by saline to remove loose epithelium. They were then painted with a 1% aqueous solution of gentian violet followed by a 10% solution of silver nitrate and a 15% tannic acid solution alternately, dabbed on with gauze swabs. A firm coagulum formed almost instantaneously. The arm and leg were then wrapped in sterile towels, and the patient was returned to bed and placed once more under the shock cradle. The towels were removed, and the affected areas were thus exposed to the warmth of the electric bulbs for drying. A post-operative injection of morphine and atropine was given. Throughout the next forty-eight hours the three solutions—gentian violet, silver nitrate, and tannic acid—were applied in the above order every two hours by means of camel-hair brushes. Thereafter the solutions were applied thrice daily for another two days, and once daily for a further three days. To rest the arm a plaster slab splint covered with boric lint was applied to the volar aspect of the forearm and hand and secured by light bandaging.

Apart from a slight temperature for three days (100° F. at night) progress was uneventful. The tanned areas were completely painless and no underlying oedema developed. There were no pulmonary complications. By the seventh day the coagulum had begun to separate from the face. It peeled away from the eyelids first and, mobility being thus restored, the tendency to conjunctival irritation passed. Large areas of healthy pink epithelium were coming into view when the patient was transferred elsewhere on the eleventh day. We have since heard from Major Dennison, R.A.M.C., that this patient has now healed completely with no trace of scarring or contracture.

Case 2.—German airman aged 24. Extensive second-degree burns of the whole of the face and flexor aspect of the right wrist, with also a simple comminuted fracture of the right tibia and fibula. Resuscitation was carried out as in Case 1. Under C.2E.3 mixture the fracture was reduced and the burnt area treated also in the same way as in Case 1. After a preliminary rise to 100° F. his progress was afebrile. Gentian violet, silver nitrate, and tannic acid were reapplied in accordance with the above-mentioned routine, the burnt areas being left exposed. Peeling proceeded smoothly without splitting of the new epithelium where exposed by the cracks in the coagulum.

Case 3.—German airman aged 35. Extensive second-degree burns of the face and forehead, the right hand, the flexor aspect of the right fingers, and the dorsum of the left hand. The patient was rescued after four hours' immersion in the sea. After appropriate anti-shock measures the routine treatment was carried out under ethyl chloride and ether. A plaster splint covered with boric lint was applied to the right hand. Recovery was uneventful; a dry coagulum with no oedema was obtained. Areas of fresh healthy epithelium were already coming into view when the patient was transferred elsewhere on the fifth day.

As illustrative of the German mentality, both this patient and Case 2 were under the impression at first that the black coagulum was a method of marking them as prisoners of war. They were speedily disillusioned, and co-operated well thereafter.

Case 4.—Flight sergeant R.A.F. aged 23. Second-degree burns of the medial side of the right arm and forearm and the lateral side of the right thigh, knee, and upper calf. These burns were due to glycol. The sergeant, in baling out, landed in a field, and a well-meaning but misguided farmer insisted on applying liberal amounts of flour to the burns. The routine treatment adopted was the same as in the previous cases. The anaesthetic was pentothal sodium followed by C.2E.3. The burns cleaned well and the coagulum took firmly. There was no oedema and no after-pain. Peeling had begun by the seventh day and was complete on the arm by the fifteenth day. It should be noted that although this patient was allowed to walk about from the tenth day onwards the coagulum remained intact, and at the time of his transfer was peeling satisfactorily at the edges.

Case 5.—Pilot officer aged 23. Second-degree burns of face and dorsum of right hand, left thenar eminence, and both heels. Admitted forty-eight hours after sustaining injury. A solution of sodium bicarbonate had been applied to the face and flavine emulsion to the hands. The large oozing raw areas with grossly swollen underlying tissues, combined with the intense pain, rendered this man's condition truly wretched.

Gas-and-oxygen was administered. The burns were thoroughly cleaned and the same treatment was carried out as before. The hand was splinted with plaster-of-Paris. Pain and oedema subsided rapidly. On the nose, purulent fluid collected and oozed through a crack in the coagulum; gentian violet, silver nitrate, and tannic acid were therefore reapplied assiduously until a firm dry crust formed. On the sixth day the patient was transferred. The oedema had disappeared and the tanned areas were dry and painless.

Conclusions

In five cases of extensive superficial burns the immediate coagulation method proved completely successful. Absence of sepsis and pulmonary complications, despite the variety of anaesthetics used, is noteworthy. This method is a definite advance on the treatment of burns, especially in war surgery.

First-aid dressing for burns is still primitive in many places.

Thorough gentle cleansing, especially of all loose epithelium, is essential before applying the solutions.

The opinion expressed by Cohen (1940) that no case is too late for full treatment in the theatre is emphatically agreed with.

Splinting the burnt limbs in the early stages to ensure rest (Cohen, 1940) and to prevent contractions is essential. No dressings otherwise are required.

The exacting routine of repeated applications of gentian violet, silver nitrate, and tannic acid solutions to produce a dry smooth coagulum is well justified by results.

We are indebted to Major H. G. Hobson, R.A.M.C., for permission to record these cases, for much help in carrying out their treatment, and for advice and many hints in recording them.

REFERENCES

Cohen, S. M. (1940). *British Medical Journal*, **2**, 251.
Dennison, W. M. (1939). *Lancet*, **2**, 1107.

HEPARIN IN SUBACUTE BACTERIAL ENDOCARDITIS

BY

GERALD C. DOCKERAY, M.D., M.Sc., D.P.H., F.R.C.P.I.

Honorary Physician, Dr. Steevens' Hospital, Dublin

AND

EINHART KAWERAU, M.B., B.Ch.

The therapeutic results of the treatment of subacute bacterial endocarditis with heparin and sulphonamide as recorded in American journals (Kelson and White, 1939; Friedman, Hamburger, and Katz, 1939) are noteworthy, and justify the report of a case treated in this way. The American reports must be mentioned, but space does not permit of their discussion. They do not give an account of the bacteriological investigation and controls done in every case, and thus leave their claim to diagnosis and complete cure often open to doubt. For this reason frequent bacteriological tests were performed and recorded in the investigation of the present case.

Case Report

A girl aged 19 was admitted to Dr. Steevens' Hospital for observation. She suffered from recurrent rheumatic swellings of the joints and an old-standing mitral lesion of the heart. Her present complaints were a swollen and painful left ankle and hip, great weakness, and sweating. On physical examination she appeared normally developed, and among the abnormal findings were painful periarticular swellings of the left ankle and hip, increased heat over these joints, and some degree of limitation of lateral rotation and flexion of the hip-joint. The heart was moderately enlarged and a loud systolic murmur was present in the mitral area. During the first three weeks the patient was under observation she ran an intermittent moderate temperature, which reached 101° F. on numerous occasions. She was listless, and often delirious at night. The urine contained some albumin, a few leucocytes, and a large number of red blood cells. The blood showed a moderate degree of secondary anaemia. The blood culture was positive after thirty-six hours, the organism being *Strep. viridans*. During the following week the patient's condition deteriorated; the albuminuria became more severe, and a chain of petechial spots broke out around the neck. A blood-agar plate made with 1 ml. of her blood grew 220 colonies of the organism.

Treatment consisted of the following therapeutic agents: (1) sulphapyridine (M & B 693) was given to combat the bacteriaemia; (2) heparin (the preparation liquemine of Roche Products Ltd.) was given as the anti-coagulant and probably fibrolytic agent; (3) vitamin C was administered freely to aid fibrous repair as recommended by Kelson and White.

The sulphapyridine was given orally powdered in milk, and occasionally, when vomiting was too severe, by injection. The concentration of the drug in the blood was estimated daily by Werner's (1939) method. The heparin powder was made up in 350-mg. lots and autoclaved in 1 litre of saline or glucose saline. After a priming injection of 40 mg. in 5 ml. of saline the heparin was given by continuous intravenous drip—15 to 18 drops per minute, running for nine days in succession. An efficient control over such a slow and prolonged drip was easily obtained by the use of the rotary-pump transfusion apparatus. The effect of the drug was watched by the estimation of the clotting time by Lee and White's method (four tubes); the prothrombin time was also estimated. Vitamin C was administered in 200-mg. doses four-hourly until there was a free urinary overflow of the vitamin. A maintenance dose of 100 mg. daily was then given.

The analytical data are shown in the accompanying table.

Day of Active Treatment	Heparin (ml. in 24 hrs.)	Sulphapyridine (gm. in 24 hrs.)	Total Sulphapyridine of Blood (mg. per 100 c.cm.)	Clotting Time (minutes)	Prothrombin Time (minutes)
				7	12
				8	10
1st		3			
2nd		3		8	10
3rd		2.5			
4th	510	5.5		70	10
5th	775	3	6.0	105	12
6th	550	5.5		110	
7th	700	6	7.2	115	14
8th	500	6	9.6	130	12
9th	700	6	8.0	100	12
10th	800	6			
11th	600	6			
12th	300	6		10	

The effect of the treatment was dramatic—the heparin acted promptly, increasing the clotting time from seven minutes to over one hour. The patient came out of the listless condition, began to take interest, and even sat up in bed reading a novel. No new petechiae formed and the old ones disappeared altogether; a large subcutaneous node on the right temple also disappeared. Towards the end of the period of treatment the albumin in the urine had become much more scanty. The temperature was around normal levels during the administration of the sulphapyridine. This drug was badly tolerated at the beginning; it was discontinued on the twelfth day of treatment, when the blood count revealed a moderate leucopenia with a very toxic appearance of the white cells. All blood cultures made during the administration of sulphapyridine remained negative. Eight days after the sulphapyridine was discontinued the patient broke out in a diffuse papulo-macular rash accompanied by a sharp peak of temperature up to 104° F. The rash was quickly followed by desquamation. A blood-agar plate made with 1 ml. of the patient's blood on that day gave rise to over 400 colonies of *Strep. viridans*. In the following week petechiae came out in repeated fresh crops. Osler's nodes appeared on the palms of the hands. The patient fell back into the same state as before treatment was started and gradually became worse. She lived for almost three months after treatment had been stopped.

The post-mortem picture confirmed the clinical diagnosis. There was an old-standing endocarditis of the left auricle and of the cusps of the mitral valve, parts of which were completely destroyed and replaced by granulations. Large infarcts were present in the spleen and kidneys.

Conclusion

Heparin proved to be a powerful anti-coagulant. It exhibited its action in a concentration of 350 mg. per litre, whereas a concentration of 250 mg. per litre remained without effect. The combined treatment with heparin and sulphapyridine was only of very transient value. This does not, however, disprove the theoretical value of its application, considering the few occasions it has been used.

We are indebted to Messrs. Roche Products Ltd. for generously making available to us without charge a sufficient supply of heparin for use in this case.

BIBLIOGRAPHY

Best, C. H. (1938). *British Medical Journal*, **2**, 977.
Friedman, M., Hamburger, W. W., and Katz, L. N. (1939). *J. Amer. med. Ass.*, **113**, 1702.
Kelson, S. R., and White, P. D. (1939). Ibid., **113**, 1700.
Werner, A. E. A. (1939). *Lancet*, **1**, 18.
Witts, L. J. (1940). *British Medical Journal*, **1**, 484.

Clinical Memoranda

A Case of Silent Mastoiditis

The following case seems to be interesting enough to be placed on record.

Case Report

The patient, a married woman aged 38, was suffering from an attack of influenza. She had had good health, with no ear trouble. When first seen on January 20, 1939, she complained of severe bilateral otalgia and tinnitus of three days' duration. She was extremely deaf.

Examination revealed considerable swelling of both external auditory meatuses. There was no bulging, and no landmarks were visible on either drum. Slight tenderness was elicited on deep pressure over the antra and tips of the mastoid processes. The temperature was 99° F., the pulse 100. Expectant treatment with sulphapyridine (M & B 693) was given.

The patient was next seen on March 14, 1939, when she complained of deafness in both ears and tinnitus with a slight discharge from the right ear, which began on February 10. On examination it was found that narrowing of the external auditory canals was still present. There was a small perforation in the postero-inferior quadrant of the right drum. The left drum was thickened, of dull red colour, and all landmarks were obscured. The whispered voice was audible in both ears at about two feet, and the conversational voice at eleven feet. The upper tone limit was lowered and the lower tone limit raised. The audiogram showed a mixed type of deafness with considerable inner-ear involvement.

The situation remained unchanged until April 3, 1939, when the patient presented herself with extensive swelling and oedema over the left mastoid extending below the tip. The following day a left cortical mastoid was performed. There was a subperiosteal abscess, and a cellular type of mastoid was encountered. The cells were necrotic and full of thick pus. A large tip-cell had perforated and pus was tracking down the sternomastoid. The dura mater at the site of the lateral sinus and middle cranial fossa was exposed by disease and was covered with healthy-looking granulations. The wound was packed with flavine and paraffin gauze, and sutured for two-thirds of its length in the usual manner. Examination of the pus revealed pneumococcus Type III.

The patient made an uninterrupted recovery. Examination on June 10, 1939, showed that the hearing was practically normal for speech in both ears. The audiogram, however, revealed considerable hearing loss above 4,000 c.p.s.

Observations

This was a case of silent mastoiditis affecting both ears, and was caused by the notorious *Streptococcus mucosus*. The disease ran the irregular course characteristic of this organism, with scanty discharge from the right and absence of discharge from the left ear. The swelling of the external auditory meatus so often noted in this type of case was a pronounced feature throughout. In the latent stage, approximately two months, deafness and tinnitus were the only symptoms. In the first instance both ears appeared to be equally involved. Under treatment with sulphapyridine the right ear cleared up completely after two and a half months, but the left ear required operative intervention. Although the operation revealed extensive destruction of bone in the left mastoid, with considerable exposure of the dura mater, which is often fraught with serious consequences in this type of case, no complications ensued. This no doubt was due to the protective influence exerted by the sulphapyridine.

Lincoln. DOUGLAS Y. RICHARDSON, M.R.C.S., D.L.O.

M. Greenberg, S. Frant, and R. Shapiro (*J. Pediat.*, 1940, **17**, 363) record the case of bacillary dysentery, Flexner Type V, occurring in a newborn male infant who was in contact with its mother only at the time of birth. The incubation period was two and a half days. The child died on the twelfth day of life.

Reviews

INJURIES OF THE BRAIN AND CORD

Injuries of the Skull, Brain, and Spinal Cord. Neuro-Psychiatric, Surgical, and Medico-Legal Aspects. Edited by Samuel Brock, M.D. (Pp. 632; 63 illustrations. 38s. 6d.) London: Baillière, Tindall and Cox. 1940.

Though surgeons may have to turn to other works for details of operative technique and for the full considerations of the indications for and contraindications in surgical intervention in cases of injury to the brain and spinal cord, this book supplies the need for guidance and advice upon many of the problems which the physician meets with in injuries to the brain and spinal cord. We do not wish to infer that the book does not contain much that the surgeon must know: on the contrary, it is imperative that he should be familiar with the complications of head injuries which do not call for surgical treatment as well as with those that do; but it is the disturbances of cerebral function resulting from injury which are quite rightly emphasized in this book, rather than the purely surgical aspects of the subject.

The volume consists of contributions by twenty-two authors, the whole being well arranged and properly edited to avoid undue overlapping. The pathology of brain injury is dealt with by Professor Hassin, and after a brief account of fractures and osteomyelitis of the skull there is a chapter by Dr. C. P. Symonds on concussion and contusion of the brain which incorporates most of his now classical work on this aspect of head injuries. Dr. Ritchie Russell writes on injury to the cranial nerves, and intracranial haemorrhage is briefly considered by Professors Friedman and Peet. The indications for operation when extradural or subdural haematoma is suspected are so important that we feel that a more dogmatic style could have been introduced with advantage in this section.

Post-traumatic brain abscess and meningitis are dealt with by Dr. F. C. Grant, and Dr. Davidoff gives a faithful account of the Cushing method of handling penetrating wounds of the brain—a method which can scarcely be improved upon if sufficient attention be paid to the details of the technique as originally described. There is a useful chapter on cerebral birth injuries, and Dr. Elvidge gives the Montreal views upon the pathology and treatment of post-traumatic fits. The sections dealing with neuroses and psychoses in association with brain injury are rather unconvincing, for clear proof that injury has caused the mental changes is usually lacking, and the vague statements about treatment are such as one might expect from experience of the slight amount of benefit commonly derived from treatment of these cases by the psychiatrist. There are valuable chapters on malingering and on the medico-legal aspects of injuries to the brain and spinal cord, and a well-illustrated chapter by Dr. C. G. Dyke on the radiography of skull fractures has been included.

The section of the book dealing with injuries of the spinal cord and nerve roots is rather short, and Professor Elsberg's chapter especially gives one the impression that the space allotted to him has been too small to allow him to do justice to his subject. The very intricate problems of when to intervene and perhaps more important still when not to intervene in these cases has been given only a superficial review, and the management of the associated disturbances of micturition receives inadequate consideration. These, however, are minor criticisms of a book which maintains a generally good standard throughout,

and which, in approaching the subject from the physician's point of view, makes a definite effort to put surgery in its proper place in regard to injuries of the brain and cord.

CYCLOPROPANE ANAESTHESIA

Cyclopropane Anesthesia. By Benjamin Howard Robbins, B.A., M.S., M.D. (Pp. 175; 40 illustrations. 16s. 6d.) Baltimore: Williams and Wilkins Company; London: Baillière, Tindall and Cox. 1940.

This book is composed of two main parts, although the division is not stated explicitly. In the first part, which is about two-thirds of the whole, are described the physical and chemical properties of cyclopropane, the concentrations required for anaesthesia and for respiratory arrest, and its effects on the circulatory and respiratory systems, the gastro-intestinal tract, the blood, the liver, the kidneys, and other tissues. The observations described were made partly on man and partly on animals in controlled conditions. Some of these observations were on the action of cyclopropane alone, and some on its action when used in combination with other drugs. Several points of particular interest arise from the author's own work. Using dogs, he found that cyclopropane alone produced no cardiac irregularities unless respiration was depressed so much as to cause severe anoxaemia; nor did morphine alone in therapeutic doses give rise to irregularities, whereas if morphine was followed by cyclopropane cardiac irregularities similar to those observed clinically did appear. He found, moreover, that if a barbiturate was substituted for the morphine the irregularities did not occur, and that premedication with morphine and barbiturate together prevented the irregularities. It is the experience of several practising anaesthetists that Prof. Robbins's findings are applicable to man.

The last third of the book describes the clinical administration of cyclopropane, complications during and after its use, indications and contraindications, and explosion hazards with this gas. Some very practical-minded anaesthetists may, however, be disappointed that details of technique are not discussed. A good bibliography is provided, there is an adequate index, and the illustrations have been well executed. The reader does, however, receive one little jolt. On pages 124–6 "wbc" and "rbc" are used for white blood cells and red blood cells respectively. The total saving of about one line does not seem worth the impression of untidiness thereby imparted.

The book is not for the beginner in anaesthesia, since a good knowledge of anaesthesia with the more common agents is assumed. Certainly a mastery of the physiological and pharmacological principles underlying the use of cyclopropane should make for better anaesthesia. Towards this Prof. Robbins helps the reader with summaries of the earlier chapters.

DISEASES OF THE HAIR

Diagnosis and Treatment of Diseases of the Hair. By Lee McCarthy, M.D. (Pp. 672; 291 illustrations, including 7 in colour. 50s. net.) London: Henry Kimpton. 1940.

Dr. McCarthy has written a comprehensive account of present-day knowledge of diseases of the hair. Like every writer on this subject, he is inevitably much indebted to the late Robert Sabouraud, under whom he had the advantage of working at one stage of his professional life, and he acknowledges his obligation by dedicating the present book to his old master. The natural history of the subject is particularly well dealt with, and the various congenital anomalies of the hair and scalp are adequately described, also the variations in different races. The same is true when he passes on to examine the various and numerous pathological changes in the hair and scalp; in these sections the author, as one would expect from one who has to his credit a good treatise on the histopathology of the skin, does complete justice to the micropathology of the many diseases of the scalp, and the figures, whether photographed or drawn from microscopic slides, are plentiful and illuminating. The clinical photographs are also good and well reproduced; in fact, this volume is a good specimen of high-class American book production.

It is when one comes to the therapy of scalp disease that disappointment sets in. We hasten to add that this is no fault of the author, who knows all that any other dermatologist knows on this baffling subject, but the disappointment is caused by the fact that the profession is still helpless in the presence of most diseases of the scalp. We do not forget that Sabouraud introduced the treatment of ringworm by means of *x* rays or that ultra-violet light has proved of considerable value in alopecia areata, but we fear that the lay public will never think much of the dermatologist while ordinary seborrhoeic alopecia continues to defy him, much as the common cold still defies the physician. Meanwhile we indulge in unsatisfactory theories of its causation and multiply the remedies which we may prescribe. Sabouraud pointed out the connexion between seborrhoeic alopecia and the sexual system, and when the sexual hormones were added to pharmacy a ray of therapeutic hope shone on the distant horizon, only, however, to fade away, for as yet no one has been able to enlist either an androgen or an oestrogen to overcome the dragon of early baldness. McCarthy pins his faith to the carbon tetrachloride and sulphur method of Sabouraud, which has the disadvantage of evil odour and the evaporation of an inflammable gas but which if persisted in, Sabouraud asserted, delays the onset of alopecia for ten years. However, research is always going on on this difficult subject, and one day no doubt the solution of the problem will be vouchsafed to us. In the meanwhile we can commend Dr. McCarthy's book to the profession as one that contains all that is at present known about diseases of the scalp and hair. It will be found both useful and interesting.

DUKE-ELDER'S OPHTHALMOLOGY

Textbook of Ophthalmology. By Sir W. Stewart Duke-Elder, M.A., D.Sc., Ph.D., M.D., Ch.B., F.R.C.S. Volume III: Diseases of the Inner Eye. (Pp. 1,372; illustrated. 70s. net.) London: Henry Kimpton. 1940.

What a pleasure it is, and how refreshing in these days when our minds are constantly filled with records and incidents of ruthless destruction and barbaric slaughter, to turn for a moment to a good book, to turn to a great piece of constructive work, and to be absorbed in the study of that book! This has been the happy experience of the reviewer of the third volume of Sir Stewart Duke-Elder's magnificent work, his *Textbook of Ophthalmology*. It is so fine a piece of work, so filled with enlivening records of observations of ocular conditions, of their diagnosis, and of the several methods of their treatment, that the reading of any page is to experience a complete absorption in the realm of ophthalmology, and an entire forgetfulness of external disturbances, however threatening these might seem to be.

There is no ophthalmologist in this country, and, indeed, in any English-speaking country, who has not felt, and sometimes recorded, his gratitude to Duke-Elder for the excellence and comprehensiveness of his work as shown in the first two volumes of his great textbook. This third volume will be perhaps even more absorbing, for it deals with Diseases of the Inner Eye: a subject lending itself to a profusion of illustration which is in

itself attractive. The several chapters deal with diseases of the uveal tract, of the retina, of the optic nerve, of the vitreous body, anomalies of intraocular pressure, and finally conditions due to intraocular parasites. To mark with distinction any one of these sections is in no way to suggest a lesser value for the others. But the impression gained by perusal of the two hundred pages on anomalies of intraocular pressure and glaucoma is most stimulating and hopeful. Of that grave and perplexing disease, or group of diseases, there is nowadays some wider and more penetrating knowledge, and some better and more hopeful means of relief. This experience is summed up by the author in these words:

"In the average case the end-results depend essentially on two factors—the stage at which the patient comes under treatment, and the sustained adequacy of the treatment: the disease is not cured, but arrested; it is always there so far as our present methods of treatment are concerned, and constant observation and eternal vigilance must be maintained in a cat-and-mouse manner so that any exacerbation may be met by a change in the medical treatment or a new surgical attack. On the whole, *many more bad results arise from postponing an operation than from performing one.*" (The italics are the author's.)

This third volume of the textbook is of such a high order that we wish it could have come to us in normal times—in times when the minds of all are concentrated upon constructive work. But even in the catastrophic conditions of to-day we are sure that this great piece of work of Duke-Elder's will claim the attention of, and be of the highest value to, every English-speaking ophthalmologist the world over.

Notes on Books

Mechanisms of Biological Oxidations, by DAVID E. GREEN, is a short monograph that describes as simply as is compatible with accuracy the complex mechanisms by means of which living cells carry out oxidation processes. (Cambridge University Press, 12s. 6d.) Oxidative processes may involve either a gain of oxygen or a loss of hydrogen, and one method of treating the subject is to classify enzymes as oxidases, peroxidases, dehydrogenases, etc. The alternative method adopted by the author is to classify the enzymes according to their structure. Those enzymes whose structures are known are composed of a prosthetic group combined with a protein carrier. The structure of the prosthetic group is known in a large number of cases, and the author bases his classification on these structures and considers in turn groups such as the iron porphyrin protein, flavoprotein, thiaminoprotein enzymes, etc. This arrangement makes the account relatively easy for those who are not enzyme specialists. The subject is, however, inherently difficult, because knowledge has advanced very rapidly in recent years, has revealed a system of a complexity hitherto unsuspected, and is still advancing. Our knowledge, however, is still very incomplete, as is evidenced by the fact that we are still uncertain as to the part played by well-known substances such as ascorbic acid and glutathione in the oxidation-reduction mechanism of cells. The volume provides a short and clear account of what is known to-day about the processes on which depend the activities of the great majority of forms of living cells.

Nursing Care Studies, by D. M. JENSEN, is a product of a movement which is rapidly gaining ground in America to enlarge the nurse's attention from technique to real awareness of the personality of the patient. To this end nurses are set, as part of their training, to compile detailed records of chosen cases under their care. These contain nursing, medical, and social data about a particular patient, analysed and arranged to give a clear picture of the nursing situation. Mrs. Jensen, a pioneer of the method, has revised her two former editions and has enlarged them by including in the introductory section chapters on interviewing, the patient as an individual, and the nurse as a health teacher. She also deals here with the circumstances of the patient and his family, and the relation of the hospital to the community. Then follow sections on the general principles of the making of studies, and outlines for special studies—medical, surgical, obstetric, diet, kitchen, home, and the like. Model studies are given, and the last chapter contains notes on collecting and analysing data. In this book, as in many other American textbooks, each chapter contains a summary, a set of questions and exercises, and a bibliography. As a means of making a nurse think for herself this method seems to have great possibilities. The volume is published at 7s. 6d. by the Macmillan Company.

William Blackwood and Sons, Ltd., have published a twelfth edition, rewritten and enlarged, of *Practical Nursing, including Hygiene and Dietetics*, by W. T. GORDON PUGH, M.D., F.R.C.S., with the help of ALICE M. PUGH, S.R.N. This consists of two parts, the complete volume being 15s., or Part I, separately, 5s., and Part II, 12s. It is intended as a textbook for the probationer nurse, reinforced by study of one of the small textbooks on anatomy and physiology only. Of the earlier editions over 76,500 copies have been sold.

Preparations and Appliances

A NEW AND SIMPLER TOURNIQUET

Professor MILROY PAUL, F.R.C.S., Ceylon Medical College, Colombo, writes:

The ideal tourniquet should be sure in action and easy to apply. It is desirable that it should also be compact, and that any perishable parts should be easily replaceable. These requirements would be fulfilled with either the Finochetti or the Fouli patterns of tourniquet, provided that ordinary rubber tubing is used instead of the special thick rubber cords usually supplied with these instruments. Moreover, ordinary rubber tubing does not become too hard in texture, nor does it cause unnecessary injury to the soft tissues of the limb. These tourniquets have, however, the disadvantage of being uncomfortable to wear on account of the direct pressure on the skin of the mounts used for fixing the rubber tubing.

I have devised a tourniquet which retains the advantages of the Finochetti and Fouli patterns without their disadvantages. The instrument consists essentially of a metal mount (Fig. 1) for fixing the ends of the rubber tubing. Two turns are taken round the arm or the thigh with ordinary rubber tubing, and the ends of the tubing are anchored in the two slots at the ends of the metal mount (Fig. 2). The metal mount is

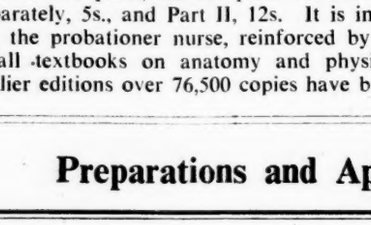


FIG. 1

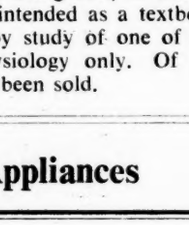


FIG. 2

curved to fix snugly round the contour of the limb, but no part of the metal mount comes in contact with the skin. The anchor arms behind the slotted ends serve to steady the metal mount as it lies on the two turns of rubber tubing. The tourniquet has given every satisfaction, and it can be recommended not only as a tourniquet for obliteration of the arterial flow but also for constricting the veins when giving intravenous injections. The instrument can be used with a wide range of sizes of ordinary rubber tubing, that size being seleced which is most convenient for the particular job in hand. The instrument was made for me locally, but I have sent a model on to Messrs. Allen and Hanburys, Ltd., 48, Wigmore Street, London, W.1, and this firm will be able to undertake the supply of these tourniquets.

BRITISH MEDICAL JOURNAL
LONDON
SATURDAY NOVEMBER 23 1940

DISINFECTION BY LIGHT

In the revival of interest in antisepsis during the past few years a good deal of attention has been given to the possibilities of ultra-violet light as a sterilizing agent. The now classical studies of Wells of Harvard on the behaviour of infected fluid droplets may be regarded as the starting-point of this development; the ease with which he sterilized artificially infected atmospheres by means of ultra-violet light was perhaps deceptive, as the particles formed in his experiments were of a different nature from those found naturally in the air. Others have nevertheless been encouraged to turn this method to practical account, and its most enthusiastic apostle has been Hart, who advocates irradiation of the field of operation in order to prevent air-borne infection in the operating theatre. We have referred in these columns to several of his previous papers; he has recently[1] published an account of further experience with this method, showing that the incidence of infection in clean wounds has greatly diminished since its adoption, and reasserting that this direct exposure to ultra-violet light is harmless to both patient and personnel. Hart's conclusions appear not to have been unquestioningly accepted in the U.S.A., and are considered somewhat critically in a cautious review of the subject of air-borne surgical infections by W. Walters and T. B. Magath,[2] who quote extensively from our own editorial comments made last year.[3] The flaw in Hart's argument is inadequate proof that the infections which his method is designed to prevent were in fact air-borne, and the inconsistencies which this assumption on his part involves. Failure to apply the coagulase test to staphylococci grown in plates exposed to air, and reliance, instead, on such deceptive characters as haemolysis and pigment production, have given a grossly exaggerated picture of the numbers of pathogenic staphylococci liable to be present in the air. The careful quantitative studies of E. A. Devenish and A. A. Miles[4] showed that the risk from this source is small, and revealed on the other hand that very heavy staphylococcal contamination of an operation wound can occur from the surgeon's skin through minute and undetected perforations in his gloves. The whole of Hart's work needs to be reviewed in the light of these observations, and other possible explanations sought for the favourable effect of irradiating the field of operation. It may be, as we suggested last year, that bacteria from whatever source can be killed in the wound itself by light; there are those, on the other hand, who take the view that irradiation stimulates the resistance of tissues to infection, and this is therefore a factor not to be forgotten. All this is not to say that any feasible attempt to maintain the purity of air in the operating theatre should be neglected; adequate masking of the staff remains essential, and the canopies over instrument tables recommended by Walters and Magath are evidently a useful safeguard.

Hart's method of directly irradiating an operative field needs to be distinguished from a method of applying ultra-violet light which has come into more general use, and consists of treating the entire atmosphere of a room by means of tall lamps directed upwards. This proceeding obviates the need for protection to the eyes or skin of occupants, and depends on the assumption that upward air currents will continually bring the lower air strata within the effective range of the lamps. If by such means the pathogenic bacterial content of air can be substantially reduced this method of treating air has obviously almost unlimited possibilities of application, not only in such places as wards and outpatient departments of hospitals, where serious risk of air-borne infection of many kinds may exist, but in crowded premises and public rooms, and, indeed, in any enclosed space the atmosphere of which is liable to undue pollution from the air passages of its occupants. If ultra-violet light applied in this way is a really efficient preventive of air-borne infection it represents a hygienic advance of the first magnitude, the ultimate results of which are almost beyond computation. Before it can be accepted that so simple a measure is capable of such far-reaching effects, much remains yet to be done in studying the capacity of such lamps to reduce the dangerous bacterial content of air, not only under controlled laboratory conditions but in the more difficult and varied circumstances of practical use. Another type of evidence which will have to be furnished is that of reduction in the frequency of illness due to air-borne infection. Significant evidence of this kind is difficult to get, but L. H. Barenberg, D. Greene, and L. Greenspan[5] set about securing it on the right lines by comparing the incidence of upper respiratory tract infections in two identical wards of an infants' home, in one of which ultra-violet lamps were run for one-half of each hour throughout the day for four months. The results distinctly favour the method; the difference in incidence, although not striking, was statistically significant.

Ultra-violet light also has a place in the treatment of established infection. There is no doubt of the benefit sometimes to be gained by irradiating an infected surface, but some difference of opinion on the mechanism of the effect. The light is, of course, rapidly destructive to bacteria fully exposed to it under artificial conditions, but whether they are accessible by it in the fluid exudate of a wound or in underlying tissue is another matter. H. Paschoud,[6] who strongly advocates the ultra-violet treatment of contaminated wounds for the prevention as well as the treatment of infection, considers that its effect is on the tissues rather than on bacteria. This is an aspect of the now all-important subject of wound treatment which merits further study.

[1] *Arch. Surg.*, 1940, **41**, 334.
[2] *Ann. Surg.*, 1940, **112**, 271.
[3] *British Medical Journal*, 1939, **2**, 733.
[4] *Lancet*, 1939, **1**, 1088.
[5] *Amer. J. Dis. Child.*, 1940, **59**, 1219.
[6] *Presse méd.*, 1940, **48**, 387.

SCIATICA, LOW BACK PAIN, AND THE INTERVERTEBRAL DISK

Intractable pain in the lower part of the back and along the course of the sciatic nerve is a problem which concerns every branch of clinical medicine, and more exact knowledge of the possible causes of such pain will help both clinician and patient. Of late attention has been focused on lesions of the intervertebral disks and of the ligamenta flava, and disorders of these structures are now to be recognized as rare but possible causes of pain of this nature. The pioneer work of Goldthwait[1] and of Middleton and Teacher[2] has been followed in recent years by reports[3 4 5 6 7 8] from American workers of several hundreds of patients in whom intractable "sciatica" has been cured by removal of a nucleus pulposus (the more fluid central part of the disk) which has prolapsed into the lumbar portion of the spinal canal. The peripheral fibrous portion of the disk has been shown to be ruptured as a result of injury, and the nucleus pulposus has escaped backwards and thus pressed upon one or more of the component roots of the great sciatic nerve. But by no means all such protrusions cause sciatic pain; multiple prolapses of the nuclei of the disks are not uncommon in osteo-arthritic spines. On the other hand, some seventeen cases[4 9 10] have now been described in which a single protrusion has been found in the cervical region and has compressed the cord there. Herniation in the lumbar region, though nineteen times commoner than in the neck, is even so a very rare finding. Love and Walsh[8] in 10,000 cases of low back and sciatic pain seen in the Mayo Clinic diagnosed this lesion in only 300 patients (3%). A survey based upon the conditions of general practice would have disclosed an almost infinitesimal incidence, for most cases of "sciatica"—the acute and subacute "neuritic" types—run their course to cure within six months or less, and are not considered in these papers.

The outstanding clinical feature of disk herniation in the lumbar region is a chronic or intermittent pain, usually of years' duration, in the lower part of the back and along the distribution of the sciatic nerve. There is not always a history of injury, and not all the other signs described are found in every instance. Moreover, all these signs—tenderness, stiffness, and lateral curvature of the lumbar spine, a diminished or absent ankle-jerk, wasting of the dorsiflexors of the ankle, disturbed sensation in various areas below the knee, and an increase of protein in the cerebrospinal fluid—can and often do manifest themselves in cases in which there is no intraspinal lesion, just as any or all of them may indicate a prolapsed disk or even a neoplasm inside the spinal canal. Love and Walsh[11] observed that the most constant sign in 500 cases of disk herniation was Lasègue's[12]—sciatic tenderness and absence of the ankle-jerk. One-fifth of their cases had no other neurological signs at all. Spurling and Bradford[13] made a careful anatomical study, and from this Spurling and Grantham[14] claim that it is possible to diagnose clinically not only that there is a disk herniation but even which disk is injured. They place considerable reliance upon the sign first described by Naffziger and Jones[15]—reproduction of the pain and the paraesthesiae during jugular compression—and regard it as pathognomonic of an intraspinal lesion. Most other observers are less sanguine, and agree with Macey[16] that the clinical features, though they may suggest a lesion, are not enough on which to base a diagnosis.

Radiology provides a more precise diagnostic instrument. An ordinary *x*-ray examination of the lumbar spine may not show narrowing of the affected disk space in the lateral view, but a filling defect indicating the protruding disk can be demonstrated by iodized oil introduced into the subarachnoid space. This method has been employed in large series of cases by Hampton[17] at the Massachusetts General Hospital and by Love and Walsh[11] at the Mayo Clinic with correct results in over 90% of cases. It is therefore tempting to submit any patient with an intractable sciatica to intraspinal myelography. Unfortunately this necessitates the injection of 5 or 8 c.cm. of an irritant and slowly absorbed oil, which can produce a chronic meningitis unless removed by laminectomy. This is a serious potential risk to the patient whose *x*-ray film shows no filling defect. In 200 of these oil myelographies at the Massachusetts General Hospital[18] at least four patients had persistent symptoms presumably due to the oil. Careful selection of cases is therefore essential. The problem is simplified when it is known that most cases of sciatic pain have an acute onset and a duration of less than a few months, and are so very rarely due to disk protrusion that myelography is clearly not indicated in them. On the other hand, any case of sciatica of insidious onset (whether from injury or not) and of progressive course resembles any persistent disturbance of peripheral innervation in that thorough investigation must exclude, among other causes, a lesion of the central nervous axis. Torben Andersen[19] thus reserves myelography for patients with severe disabling sciatic pain for which physician, gynaecologist, proctologist, and radiologist have found no cause, and in eight such cases a filling defect was discovered in each. Less careful selection must have led to many negative results. The risks associated with iodized oil have led to the revival of the technique of air myelography, first suggested by Dandy.[20] Unhappily this is of limited use because of the lack of detail and of contrast in the resulting shadow. Recent improvements in *x*-ray apparatus have remedied some of the defects, and in the hands of Chamberlain and Young[21] the method has proved rather more reliable; it is still far less accurate than oil myelography, and Hampton[18] finds it of value only when the findings are unequivocal.

The only real proof that herniation of a disk is the cause of a patient's pain lies in complete cure after

[1] *Boston med. surg. J.*, 1911, **164**, 365.
[2] *Glasg. med. J.*, 1911, **76**, 1.
[3] *New Engl. J. Med.*, 1934, **211**, 210.
[4] Ibid., 1935, **213**, 385.
[5] *Amer. J. Roentgen.*, 1936, **36**, 782.
[6] *J. Bone Jt. Surg.*, 1937, **19**, 776.
[7] *Minnesota Med.*, 1938, **21**, 832.
[8] *J. Amer. med. Ass.*, 1938, **111**, 396.
[9] *Arch. Surg.*, Chicago, 1940, **40**, 417.
[10] *Brain*, 1936, **59**, 204.
[11] *Arch. Surg.*, Chicago, 1940, **40**, 454.
[12] *Arch. gén. Méd.*, 1864, **2**, 558.
[13] *J. Amer. med. Ass.*, 1939, **113**, 2019.
[14] *Arch. Surg.*, Chicago, 1940, **40**, 375.
[15] *Arch. Neurol. Psychiat.*, Chicago, 1935, **33**, 941.
[16] *Arch. Surg.*, Chicago, 1940, **40**, 433.
[17] Ibid., 444.
[18] Ibid. (See also Lindblom: *Acta med. scand.*, 1931, **76**, 395.)
[19] *Ugeskr. Laeg.*, 1940, **102**, 255.
[20] *Ann. Surg.*, 1918, **68**, 5.
[21] *J. Amer. med. Ass.*, 1939, **113**, 2022.

removal of the protruding mass. As originally performed this weakened the spine by a laminectomy, but Love and Walsh[11] have now perfected a limited unilateral hemi-laminectomy, first described by Taylor,[22] which entails a minimum of injury to the spine. Not the least of the many problems associated with this condition is that of the thickening of the ligamenta flava, which is often found with a ruptured disk. Several workers have reported cases in which this thickening existed alone and was apparently the cause of the patient's pain. Dickson and Twort[23] record a well-investigated case of this nature in which the excised portion of the ligament was found on histological examination to resemble scar tissue, but many more case reports are needed before a clear picture can be formed of the pathology or importance of lesions of the ligamenta flava.

HEALTH CONDITIONS IN THE SHELTERS

It cannot often have happened that a report by a committee advisory to the Government is accepted and practically all its recommendations put into operation even before it is published. This is the case with the recommendations of Lord Horder's committee on health conditions in the shelters. The committee was appointed on September 14, soon after the heavy bombing of London began, and within four days twelve of the eighteen recommendations now published were in the hands of the Ministry of Home Security and the Ministry of Health. The Government did not at first intend publication, and the informal findings were regarded as pertaining to an interdepartmental inquiry, but in some sections of the Press this attitude was regarded with suspicion, and therefore the recommendations are now published as a White Paper.[24] The principal ones were forecast in an article in the *Journal* of October 12 (p. 495), which followed upon an interview with Lord Horder.

The crux of the problem is overcrowding of the large public shelters, and the first recommendations suggest methods of popularizing domestic and communal shelters both by publicity and by the provision of amenities, such as "bunking," especially for infants, and the allocation of a particular space in communal surface shelters to specified residents. More shelters must be secured, and the committee suggests that a re-survey should be made in all boroughs with a view to finding further shelter accommodation, that shelters of factories and commercial buildings not in use at night should be requisitioned, and that examination should be made of self-chosen shelters with a view to scheduling them if the standards are satisfactory. A recommendation which rather dates itself is that the possibility of using the Tube system should be considered; 150,000 people in London now make the Tubes their nightly dormitories.

The committee goes on to recommend that certain classes of persons whose inclusion adds to the difficulty of supervision and increases the risk to health should so far as possible be evacuated; these include the aged, the infirm, and the bedridden. The Government schemes of evacuation of mothers with children should also be vigorously pursued. These measures, again, are already being taken. The committee urges the appointment of shelter marshals as whole-time officials, and a number of paid shelter wardens have now been appointed in London and elsewhere. With regard to the hygiene of the shelters the committee recommends that local authorities be authorized to provide adequate sanitary equipment within the shelter, with extra staff for proper cleansing, that the medical officer of health and his staff should make regular inspection of the shelter, and that the provision of first-aid points in large shelters should be encouraged. These have all been the subject of instructions to the appropriate authorities in the London Civil Defence Region as well as in regions outside. It is also suggested that beds and bunks should be allotted to the medical aid post at the rate of two beds and three three-tier bunks for every 500 persons in the larger shelters, with means of screening off patients for simple medical examination. This recommendation with a schedule of equipment and drugs for such posts has been incorporated in an official circular of instructions.

On the matter of air space per person it is acknowledged that in this baffling situation no standard can be laid down, but the standard of 50 cu. ft. per person advised by the Ministry of Home Security for naturally ventilated shelters might be followed until the present position of overcrowding is eased. A dominant factor making for general discomfort and air pollution by smell is the presence of closets in the shelter, and the committee recommends that the men's closets should be placed outside the shelter proper. Shelter wardens should be instructed on the matter of ensuring efficient ventilation so far as possible. It is pointed out that shelters which are liable to crowding do not require heating, even in winter. Some form of heating might be provided for sparsely occupied shelters during the latter part of the day-time. For spraying the air of shelters the antiseptic recommended is sodium hypochlorite in aqueous solution, and provision is being made for this in the schedule of equipment issued to local authorities. It is also urged that every encouragement and facility should be given to local authorities to popularize protective inoculation against diphtheria and that the diphtheria toxoid necessary be supplied. An appropriate circular on this point is to be issued as soon as possible. In the absence of good evidence that to supply vitamins in the form of medicines reduces the incidence of common bacterial infections, the committee does not advise their use in this form.

Both the committee and the Government Departments are to be congratulated on the promptitude with which the recommendations have been made and the action taken. It is reassuring that the committee is remaining in existence. It has on its agenda the question of a simple form of face mask to prevent droplet infection, the use of other prophylactic measures such as throat-spraying, and the possible means of diminishing the risk of the spread of body vermin. No doubt other health problems will present themselves in due course.

[22] *J. nerv. ment. Dis.*, 1910, **37**, 257.
[23] *Lancet*, 1940, **1**, 1113.
[24] Ministry of Health and Ministry of Home Security. Recommendations of Lord Horder's Committee regarding the Conditions in Air-raid Shelters with Special Reference to Health; and a Brief Statement of Action taken by the Government thereon. Cmd. 6234. London: H.M. Stationery Office. 2d. net.

TOXIC MANIFESTATIONS OF THE SULPHONAMIDES

Ever since Ehrlich first produced arsphenamine it has been the chemotherapist's dream to discover remedies which would leave unharmed the tissues of the body while destroying entirely the parasites that infest them. Unfortunately, just as no rose is without its thorn, so up to the present no chemotherapeutic remedy is without its toxic manifestation. Nevertheless it is easy to exaggerate the frequency and importance of such side reactions, to use an American term, because for every patient whose case is duly recorded as an example of toxic features caused by chemotherapeutic agents there are many hundreds who pass unnoticed, because their treatment is unattended with any untoward results. This tendency to stress the importance of toxic reactions has been especially noticeable in the case of the sulphonamide drugs, although the incidence of severe reactions due to these compounds has in fact been extraordinarily small. The two most spectacular and dangerous reactions caused by the sulphonamide drugs are undoubtedly acute haemolytic anaemia and agranulocytosis. Some slight degree of macrocytic or normocytic anaemia occurs in about 3% of persons subjected to prolonged sulphanilamide medication, due, according to Watson and Spink,[1] to a disturbance in haemoglobin formation as well as to some slight degree of haemolysis. Only some seventy cases of acute haemolytic anaemia, however, have been recorded, about two-thirds of them due to sulphanilamide and a considerable proportion in negroes. Between seventy and eighty cases of agranulocytosis caused by sulphonamide compounds have been fully recorded, and incidental mention has been made of between forty and fifty others. Even if only one-tenth of the cases of agranulocytosis and acute haemolytic anaemia have been reported the incidence of these two toxic manifestations is infinitesimal when compared with the millions of people who in the past four years must have been subjected to treatment with the sulphonamides. In order to gain a more correct idea of the character and frequency of the poisonous effects of these drugs and their importance in the course of therapy, Long and his colleagues[2] have recently analysed the incidence and types of reaction in patients admitted to the Johns Hopkins Hospital during the past few years, 1,000 having been treated with sulphanilamide, 297 with sulphapyridine, and 291 with sulphathiazole. Kolmer[3] has also summarized the various toxic reactions due to these compounds. All three—sulphanilamide, sulphapyridine, and sulphathiazole—and others less rarely used such as uleron, rodilone, and albucid, show a certain similarity in the types of reaction they produce, but like the members of a human family each has its own individual peculiarities. Thus nausea and vomiting are uncommon with sulphathiazole, fairly common with sulphanilamide, and very frequent with sulphapyridine, at least in white adults, for, curiously enough, negroes and children rarely react in this way. Neuritis is very rare with sulphanilamide and has not been reported with sulphapyridine or sulphathiazole, but with uleron it is by no means uncommon. Skin rashes have been recorded with practically all the members of the family, but are most common with sulphathiazole, a nodular form being especially frequent. According to Long and his colleagues skin rashes, usually appearing from the fifth to ninth day, are present in 5% of persons treated with sulphathiazole, as compared with 1.9% and 2% of those treated with sulphanilamide and sulphapyridine respectively. Haematuria has been reported only once or twice with sulphanilamide, but with sulphapyridine it occurs in 8% and with sulphathiazole in 2.5% of cases. Injection of the sclera and conjunctiva seems to be peculiar to sulphathiazole. It might have been thought that all toxic reactions to the sulphonamide drugs had already been encountered. De and Kona,[4] however, have recently described two curious cases in which the administration of small doses—7.5 grammes of sulphanilamide and 30 c.cm. of a 2.5% solution of prontosil in one instance, and 1 gramme of prontosil in the other—was followed by intense cyanosis, a rapid fall in the percentage of haemoglobin and in the number of red blood corpuscles, haematuria, methaemoglobinuria, and death. It is curious that comparatively small differences in the molecular structure of these sulphonamide compounds should be so closely correlated with differences in pathological selectivity. One of the tasks of the future is to determine the reasons for this correlation.

[1] *Arch. intern. Med.*, 1940, **65**, 825.
[2] *J. Amer. med. Ass.*, 1940, **115**, 364.
[3] *Arch. intern. Med.*, 1940, **65**, 671.

MILK IN WARTIME

The distribution of the country's available milk this winter has been severely regulated, and most authorities agree that the Ministry of Health is to be congratulated on taking strong measures to ensure that milk shall be available to those whose need is greatest. For the first time the Government assumes full responsibility for the nutrition of mothers and babies, for the good reason that they are mothers and babies and entitled to the nation's special care. Another innovation is the adoption of an income level indicating the point at which the Government considers that it becomes impossible for a family to feed itself satisfactorily without assistance. The Children's Nutrition Council[5] warmly welcomes a scheme so closely in accord with its own principles, but offers a few constructive criticisms and practical suggestions. Some people are anxious about the absence of any standard of quality for the milk supplied, but there seems no solution to the local difficulties of pasteurizing. The toddler has at last come into his own, but the regulation assumes that every child of 5 goes at once to school, and there is thus in practice a gap between the fifth birthday and the first school day which needs attention. The national dried milk, to be supplied free for infants, has come under criticism, and the suggestion is made that the existing milks sold at welfare centres should instead be incorporated under the scheme, because they have many modifications which make them better for certain infants. The milk distributive trade as a whole has agreed to work the scheme, but some sections of it are by no means satisfied. The Children's Nutrition Council regards the income limit (£2 a week for two parents, £1 7s. for one, and 6s. for each dependent child) as too low. Owing, the council claims, to muddled publicity at the outset the response to the scheme is still unsatisfactory, and it urges the introduction of new and bold publicity methods. The Government milk scheme is supplemented by the Board of Education's Circular No. 1520, which reminds local education authorities of the provision of free milk and free meals for children attending school. About half the authorities still do not provide free meals, and twenty-five authorities provide no free milk. The Board encourages them to do better by increasing the grant, and the Children's Nutrition Council only regrets that the whole service has not been reorganized; it cannot agree that a free meal is a medicine for the sick, only to be awarded after a doctor has diagnosed malnutrition. Delivery of milk to the home during

[4] *Indian med. Gaz.*, 1940, **75**, 385.
[5] 35, Marsham Street, London, S.W.1. Bulletin No. 6.

holidays or other school absence is also recommended. Nevertheless, there is room for immense and satisfying improvement within the existing scheme if only the local authorities will interpret it generously.

POLIOMYELITIS VIRUS IN STOOLS AND SEWAGE

The shift of attention from the respiratory to the alimentary tract as the source of infection in poliomyelitis is illustrated by a further series of observations made in the U.S.A., the results of which bear out conclusions previously reached there and in Sweden. J. D. Trask, J. R. Paul, and A. J. Vignec[1] report further successful attempts to isolate the virus from faeces. Specimens reached them not only from cases in widely separated epidemic areas in the U.S.A., including a Southern city whence transit in hot weather occupied four days, but from England. Specimens of faeces from cases in an epidemic in Essex were etherized at the National Institute for Medical Research and posted to Yale, arriving sixteen days later, some of them giving positive results. The virus apparently survives for longer periods in faeces than in sewage, which was examined by J. R. Paul, J. D. Trask, and S. Gard.[2] The results of this study were somewhat erratic, and dilution of infective material combined with the toxicity of larger doses of sewage extracts for monkeys evidently militates against regular success. Nevertheless, the effluent from isolation hospitals where cases of poliomyelitis were being treated was shown to contain the virus—in one from the hospital sewer itself and in another from a pumping station at some distance. The method of preparation is all-important when such crude material has to be examined; treatment with ether, which kills most of the bacteria present but not the virus, is the clue to such success as has hitherto been achieved. Gard[3] hopes to improve on this method by also precipitating with ammonium sulphate; a demonstrable amount of virus can thus be obtained in a smaller volume and more or less free from toxic substances found in sewage. All these writers are silent on the broader implications of such studies. It is now certain that the alimentary tract is a portal of exit for the virus of poliomyelitis, and probable that it is also a portal of entry. What we do not yet know is the relative importance of the alimentary and respiratory routes, or, indeed, whether our previous notions about the air-borne transmission of this disease are not mistaken. The proper measures for checking the spread of an epidemic depend on the answer to this question.

MALARIA ON THE BURMA ROAD

Now that the famous road between North Burma and the interior of China has been reopened it is doubtless crammed with lorries carrying stores and munitions. Many readers may look on the Japanese air force as the principal enemy of the road and its users. Dr. R. Cecil Robertson, of the League of Nations Epidemic Commission and the Henry Lester Institute at Shanghai, believes that malaria is likely to do much greater damage. He states[4] that landslides are frequent, and convoy drivers have to sleep and live in their waggons without protection from mosquitos for several days. The depots on the road have been chosen for geographical and other reasons, without regard to epidemiology. This, he considers, is a great mistake, which will be paid for by ill-health to the community that will far outweigh the advantages of the sites. Unless certain well-defined steps are taken the road will not develop and prosper, and, until they are taken, a very high price in life and suffering will be exacted. Malaria is the chief cause of the scarcity and inefficiency of the labourers on the road, and unless the gangs have some medical attention and quinine they will not remain at work. There are practically no hospitals available, and it is essential that a new hundred-bed hospital for Chinese be installed at Lashio (North Burma). The Burmese authorities should, he thinks, take a long view and co-operate generously in the medical field, facing at once a problem which is bound to harass them later as the importance of their sanitary frontier with the new Chinese colony along the road increases. On the basis of a thorough survey conducted by himself and his assistants, he puts forward a plan for combating malaria on the road. The measures he suggests begin with providing nets and screened hostels for the transport workers and sprays for the vehicles. Quinine should be distributed to all workers instead of, as at present, irregularly. The indigenous population should be educated in health measures and the local Shan population freed from the parasite. Medical aid and proofed shelter should be provided for the labourers. The transport depots should be placed at suitable sites away from the swamps and be screened; medical and hospital facilities should be improved. New stations should be sited on healthy ground and the present villages avoided; the building of new villages should be controlled. If proper steps are taken now, says Dr. Robertson, the Chinese authorities may look forward to a comparatively healthy route to Burma. If they limit themselves to stop-gap expedients they will create a much worse malaria situation, which in two decades will be very costly to put right.

[1] *J. exp. Med.*, 1940, **71**, 751.
[2] Ibid., 765.
[3] Ibid., 779.
[4] *Chin. med. J.*, 1940, **57**, 57.

IMMUNIZATION AGAINST RESPIRATORY INFECTIONS

In a recent leading article in the *Times* on the prevention of epidemics it was suggested that protection against "winter ailments such as coughs and colds, influenza, bronchitis, and pneumonia" by means of vaccines was of little avail. The article went on to say that so long as shelters had proper sanitary conveniences, were properly ventilated and warmed, and were not overcrowded there was no "reason to anticipate a higher degree of morbidity than occurs in other places." We fear that this discouragement of preventive inoculation may hinder those who are attempting to use whatever opportunity is afforded for testing the effect of vaccines under conditions where spread of infection might well be anticipated. It cannot, for example, be disputed that vaccine made from influenza virus A affords protection against this disease. At the moment experiments are being conducted under the auspices of the Medical Research Council with a modified vaccine of virus A sent to this country by American workers. While, therefore, there is everything to be said for attempting to secure as reasonable living conditions as possible for those who have to spend their nights in shelters, there is as much to be said for enhancing their resistance to air-borne and droplet infection by immunological methods where these are backed by scientific evidence of efficacy.

The next session of the General Medical Council will open on Tuesday, November 26, at 10 a.m., when the President, Mr. H. L. Eason, will take the chair and deliver an address.

A MOBILE FIELD LABORATORY

A DESCRIPTION OF TWO MOBILE LABORATORIES ORGANIZED FOR THE SOUTH AFRICAN MEDICAL CORPS

BY

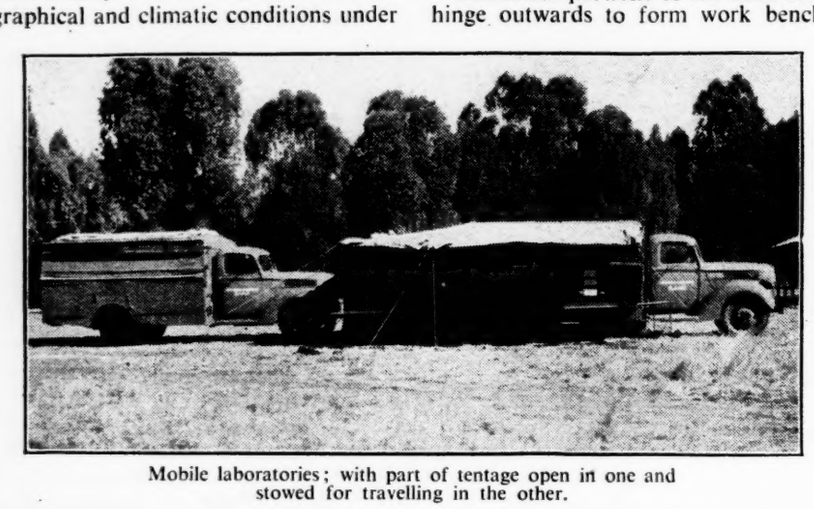
W. LEWIN, M.D., D.P.H., D.T.M. & H.

Captain, No. 1 Mobile Laboratory, S.A.M.C.

(From the South African Institute for Medical Research)

With the outbreak of war the construction of a mobile bacteriological and pathological laboratory—one that could perform almost all the routine investigations carried out by a well-equipped civilian institution and yet capable of being moved *in toto* at an hour's notice—was considered necessary. The desiderata were free mobility and efficiency. With these objects in view an attempt was made to design and construct locally a laboratory on wheels.

Owing to the geographical and climatic conditions under which the laboratory was expected to work—namely, long distances, bad roads, deep drifts, and a hot rainy tropical climate—we decided that the caravan type of laboratory would be entirely unsuitable, because any mechanical breakdown in the vehicle, such as a broken axle, would cause great damage to the contents and the laboratory would be unworkable until the defect was remedied. There were various other considerations which also led us to the design of the vehicle finally constructed. These will be mentioned later.



Mobile laboratories; with part of tentage open in one and stowed for travelling in the other.

Equipment of Laboratory

The chassis supplied by the Defence Department was a three-ton Ford truck, 1940 model. On to this chassis was fixed a platform 12 by 7 feet, allowance being made for the rear wheels to protrude above the platform. In front of and behind each of the rear wheels the four equipment boxes were clamped. These boxes measured 35 inches in width, 25½ inches in height, and 28¾ inches in depth. Two of them were fitted with three sliding drawers, the total drawer capacity occupying the whole capacity of the box. The other two were divided into compartments varying in size with the kinds of large apparatus they were to contain. Each drawer of the first two boxes was similarly divided up into compartments of different shape and size, and to the front of each was affixed a plan of that particular drawer, drawn accurately to scale, with each compartment lettered; and in addition to this plan of the drawer a list of the contents was tabulated according to compartments. This greatly facilitated the finding of any particular piece of apparatus and also expedited the packing away of material not in immediate use. With the exception of the incubator and refrigerator, both of which are fixtures to the lorry and work on paraffin, all the equipment of the laboratory is contained in the four boxes. These are not fixed permanently to the platform of the lorry, but are held in place by means of iron bands, and can be completely released by means of four butterfly nuts for each box. Thus, should it be necessary at any time to unload the lorry the whole equipment can be removed, complete in the boxes, in a few minutes, and as quickly replaced. The value of this will be found when deep drifts have to be negotiated or rivers crossed by the aid of a pontoon bridge. Should the laboratory be required at a certain spot for some months at a time where a suitable building is available the boxes can be removed into the building and the work carried out with the maximum facilities.

Method of Tentage

The greatest use of the lorry, however, will be made in places far removed from human habitation; and to work in comfort under such conditions a method of tentage has been arranged whereby within a period of fifteen to twenty minutes the laboratory is converted into a tent, rectangular in outline and extending for a distance of six feet from the lorry all round, the lorry itself acting as the centre of the tent. The framework to carry the canvas is made of steel tubing, is collapsible, and is a fixture. When travelling the canvas tent is folded on to the roof of the vehicle and strapped down, and the steel framework folds up and is held in steel brackets along the side and back of the roof.

The lower portions of the sides of the lorry are made to hinge outwards to form work benches of teak, 2 feet 6 inches from the ground, and when so folded out they expose the equipment boxes, whose lids are on the outer aspect. These lids have folded steel legs attached on their inner aspects and form additional tables, also 2 feet 6 inches in height. The removal of the box lid exposes the drawers. The equipment and apparatus are therefore situated immediately above the work benches, thereby greatly facilitating the work. The upper portion of the side and back of the lorry is a fixture, built of half-inch wire mesh on the outside; this acts as a protecting barrier to the mono-metal mosquito gauze which covers the whole of the upper portion. When travelling, canvas flaps enclose the exposed portions of the vehicle to prevent the entry of dust.

Above the wheel-housing and therefore between the two equipment boxes on each side is a rectangular tank containing 25 gallons of water, making a total of 50 gallons. The portion of the side of the lorry adjacent to the water tank folds outwards, in a similar manner to the work benches, to expose a sink which receives water from the tank through rubber tubing. The interior of the vehicle is lighted electrically by means of two six-volt batteries, which also supply current for artificial lights for the microscopes and for lighting the tent. The batteries are charged by means of a Delco petrol motor. Between the steel roof and the wooden ceiling of the lorry is an insulating layer of asbestos for coolness. A cupboard, which is a fixture, is placed between the fixed incubator and refrigerator, and the camp stools are clamped against the ceiling. A fire extinguisher completes the equipment.

Slung below the chassis and situated between the front and rear wheels are four tanks, each of 20 gallons capacity and guarded by wire mesh from rocks and stones. These constitute the fuel supply—petrol, methylated spirits, and paraffin—and each has a guarded lockable tap.

Inventory of Apparatus

A complete inventory of the apparatus and material used in the laboratory is given below. The autoclave is an ordinary domestic pressure cooker, but has an exhaust tap fitted in addition, and the bakelite thumb-screws are replaced by metal ones. The hot-air sterilizer attains a

temperature of 180° C. within half an hour, and, like the autoclave, is heated by means of a primus stove. The autoclave can be heated by the petrol stove. The apparatus for distilling water is all metal and is tinned. The filing cabinet contains approximately 3,000 cards, and, in addition, day register books are kept. A small reference library is also carried.

S.A.I.M.R. FIELD LABORATORY

Case No. 1. Top Drawer

Compartment A

1 urinometer
1 set cork borers
1 tin opener and corkscrew
2 thermometers (clinical)
2 grease pencils
1 spatula
4 thermometers (100° C.)
2 „ (360° C.)
2 dozen books litmus paper
1 pr. forceps (large)
1 „ „ (small)
1 „ scissors (medium)
1 „ „ (small)
1 dozen rubber teats
6 pinch cocks (small)
2 platinum loops in holders
2 camel-hair brushes
2 haemocytometers
2 incubator capsules (37° C.)
2 „ „ (49° C.)
2 gross threadbands No. 8
3 bottles cedar-wood oil

Compartment B

12 ft. gas tubing
6 ft. I.R. tubing (narrow)
6 ft. I.R. tubing (extra narrow)
1 hand torch

Compartment C

1×20-c.cm. Record syringe in case
1×10-c.cm. „ „ „
2×5-c.cm. „ syringes
2×2-c.cm. „ „
2×1-c.cm. „ „

Compartment D

2 glass staining troughs
1 lb. mercury
2 spare torch batteries
3 spare globes for torch

Compartment E

2 glass staining troughs
1 hand centrifuge
1 Zeiss A haemometer
250 swab tubes, 6 in.×1·4 in.

Compartment F

1 post-mortem set
1 lb. Difco dried nutrient broth
1 lb. „ „ MacConkey's agar
1 lb. „ „ nutrient agar
1 lb. „ „ MacConkey's broth

Compartment G

1 box Whatman's filter paper, No. 1; 12.5 cm.
1 box Whatman's filter paper, No. 4; 18.5 cm.
1 balance with set of weights (50 gm.)
1,000 swab wires

Compartment H

1 *p*H capillator outfit, B.D.H.
1 bottle damar
1 bottle petroleum jelly
1 Trenner pipette (white)
1 „ „ (red)
20 boxes coverslips, 3·4 in., No. 1; square

Compartment I

1 porcelain tile (12 depressions)
1 dissecting set
1 aluminium billy-can (Army pattern)
2 gauze mats with asbestos centre

Compartment J

1 spirit-burner (metal)
1 „ „ (glass)

Compartment K

8×50-c.cm. drop-bottles

Compartment L

1 set (3) enamel measuring mugs

Compartment M

1 enamel sterilizing dish

Compartment N

4 dozen small pill-boxes
5×50-c.cm. conical flasks
100 capillary tubes (10 cm.)

Case No. 1. Middle Drawer

Compartment A

24 sheets filter paper, 18 in.
2×50-c.cm. burettes
2½ lb. glass tubing
1 burette stand upright

Compartment B

1 lb. cotton-wool, absorbent
2 lb. cotton-wool, non-absorbent
2 collapsible test-tube racks
1 burette stand base
2 dozen Dreyer tubes

Compartment C

2×50-c.cm. glass measuring cylinders
2×100-c.cm. glass measuring cylinders

Compartment D

100 throat swabs—labelled
6 ft. gas tubing

Compartment E

1 nest enamel billy-cans
1 enamel reservoir

Compartment F

12×1-c.cm. pipettes, graduated
12×10-c.cm. „ „
6×5-c.cm. „ „
6×20-c.cm. „ „
3×25-c.cm. „ „
3 copper pipette containers

Compartment G

4 dozen Petri dishes
4 copper Petri dish containers

Case No. 1. Bottom Drawer

Compartment A

Bottle No. 1: 1 lb. R.B.C. fluid
„ „ 2: 1 lb. „ „
„ „ 3: 1 lb. white cell fluid
„ „ 4: 1 lb. Giemsa stain
„ „ 5: 1 lb. buffer soln.
„ „ 6: 1 lb. „ „
„ „ 7: 1 lb. Leishman's stain
„ „ 8: 1 lb. „ „
„ „ 9: 1 lb. carbol fuchsin
„ „ 10: 1 lb. Lugol's iodine ×10
„ „ 11: 1 lb. Pugh stain
„ „ 12: 1 lb. methyl violet, 0.5%
„ „ 13: 1 lb. methylene blue, 1%
„ „ 14: 1 lb. Fehling's sol. A
„ „ 15: 1 lb. „ „ B
„ „ 16: 1 lb. Ehrlich's reagent
„ „ 17: 1 lb. vaseline oil
„ „ 18: 1 lb. xylol
„ „ 19: 1 lb. acetone
„ „ 20: 1 lb. formalin 40%
„ „ 21: 1 lb. lysol

Compartment A (cont.)

Bottle No. 22: 1 lb. phenol
„ „ 23: 1 lb. methyl alcohol
„ „ 24: 1 lb. glycerin
„ „ 25: 1 lb. pot. bichromate
„ „ 26: 1 lb. sod. hydroxide
„ „ 27: 1 lb. sod. chloride
„ „ 28: 1 lb. mag. sulphate
„ „ 29: 1 lb. pot. oxalate
„ „ 30: 1 lb. pot. iodide
„ „ 31: 1 lb. sod. citrate
„ „ 32: 1 only wash-bottle

Compartment B

4 gross test-tubes, 6 in.×5/8 in.
8 wire crates
1 box Whatman filter paper, 18.5 cm.

Compartment C

500 Wassermann tubes
500 agglutination tubes, 3 in.×3/8 in.

Compartment D

600 microscope glass slides

Case No. 2. Top Drawer

Compartment A

1×8 oz. nitric acid, conc.
1×4 oz. „ „ „
1×4 oz. „ „ dil.
1×8 oz. sulphuric acid, conc.
1×4 oz. „ „ „
1×4 oz. „ „ dil.
1×8 oz. hydrochloric acid, conc.
1×4 oz. „ „ „
1×4 oz. „ „ dil.
1×4 oz. caustic soda, conc.
4×60-c.cm. drop-bottles

Compartment B

4 bottles, porcelain swing top

Compartment C

1×2 oz. caustic soda
2×2 oz. ammonium chloride
1×2 oz. ammonium carbonate
1×2 oz. ferric chloride
1×2 oz. barium chloride
1×2 oz. guaiac resin
1×2 oz. pot. ferrocyanide
1×2 oz. ferrous sulphate
1×2 oz. calcium sulphate
1×2 oz. silver nitrate
1×2 oz. ammonium molybdate
1×2 oz. pot. dichromate
1×2 oz. pot. nitrate
1×2 oz. pot. cyanide
1×2 oz. stannous chloride
1×2 oz. pot. hydroxide
1×2 oz. sod. phosphate
1×2 oz. copper sulphate
1×2 oz. sod. carbonate
1×2 oz. ammonium chloride
1×2 oz. pot. chromate
1×2 oz. zinc
2×2 oz. pot. permanganate
1×2 oz. copper foil
1×2 oz. mercuric iodide
1×2 oz. ferrous sulphide
1×2 oz. porcelain chips
1×2 oz. tartaric acid
1×2 oz. petroleum jelly

Compartment D

100×2 c.cm. Hiss's serum sugars—glucose

Compartment E

100×2 c.cm. Hiss's serum sugars—lactose

Compartment F

1×8 oz. pot. hydroxide, conc.
1×8 oz. glacial acetic acid
1×8 oz. ammonium chloride, satd. soln.
2×8 oz. ammonium hydroxide
1×8 oz. sodium carbonate, satd. soln.
1×8 oz. ammonium carbonate, satd. soln.

Compartment F (cont.)

1×4 oz. pot. iodide, satd. soln.
1×4 oz. bottle chloroform
2×4 oz. ferric chloride, satd. soln.
1×4 oz. barium chloride, satd. soln.
1×4 oz. mercuric chloride, satd. soln.
1×4 oz. tincture guaiacum
1×4 oz. lead acetate, satd. soln.
1×4 oz. bottle ether
1×4 oz. pot. ferrocyanide, satd. soln.
1×4 oz. ferrous sulphate, satd. soln.
1×4 oz. calcium sulphate, satd. soln.
1×4 oz. ammonium carbonate, satd. soln.
1×4 oz. silver nitrate, satd. soln.
1×4 oz. bromine water, dil. soln.
1×4 oz. ammonium molybdate, satd. soln.
1×4 oz. pot. dichromate, satd. soln.
1×4 oz. pot. nitrite, satd. soln.
1×4 oz. pot. cyanide, satd. soln.
1×4 oz. stannous chloride satd. soln.
1×8 oz. sod. hypochlorite soln.
1×4 oz. pot. hydroxide, satd. soln.
1×4 oz. sod. phosphate, satd. soln.
1×4 oz. copper sulphate, satd. soln.
1×4 oz. sod. carbonate, satd. soln.
1×4 oz. ammonium chloride, satd. soln.
1×4 oz. pot. chromate, satd. soln.
1×4 oz. alcohol
1×4 oz. ammonium sulphide, satd. soln.
1×4 oz. Nessler's soln.
1×8 oz. ammonium sulphide satd. soln.
1×8 oz. ferrous sulphate, satd. soln.
4×60-c.cm. drop-bottles

Compartment G

1 Government water-testing outfit

Compartment H

1 Government poison-testing outfit

Compartment I

100 Hiss's serum sugars—saccharose

Compartment J

100 Hiss's serum sugars—mannite

Compartment K

1 nest glass beakers
3 glass funnels, 3 in.

Compartment L

4 books litmus paper
22×2-oz. green poison bottles
1×2-oz. bottle filter paper strips
1 spatula
6 in. platinum wire (thick)
3 test tubes, 1 in. diameter
1 box labels (white, square)
1×4-oz. bottle ammonium vanadate

Case No. 2. Middle Drawer

Compartment A

1 copper staining bath
5 copper wire slide supports
1 wooden rack for drop-bottles
12×50-c.cm. drop-bottles

Compartment B

200×25-c.cm. bile bottles, rubber-capped

Compartment C

2×4 oz. hydrogen peroxide

Compartment C (cont.)

2 oz. salicyl-sulphonic acid (20%)
10 grammes cholesterol
60 c.cm. Kahn antigen

Compartment D

450×1-oz. specimen bottles (screw cap)

Compartment E

½ lb. Difco dried testicular medium
½ lb. Difco dried brain veal medium

Case No. 2. Bottom Drawer

Compartment A

100 oxalated tubes (blood counts)
1 box assorted corks
1 microscope lamp

Compartment B

1 spirit Bunsen burner
1,000 capillary tubes (0.02 c.cm.)

Compartment C

1 nest enamel basins (3)
1 nest enamel funnels (3)

Compartment D

10×8-oz. med. flat bottles, screw cap

Compartment E

6 watch glasses
1 porcelain crucible
1 porcelain mortar and pestle (4 in.)
1 Bunsen burner (large)
12 centrifuge tubes

Compartment F

1 microscope (travelling)
1 mechanical stage
20 gm. Leishman's stain
10 gm. Giemsa stain
20 gm. methylene blue stain
20 gm. methyl violet stain
10 gm. basic fuchsin stain

Compartment F (cont.)

1 box assorted labels
3 microscope lamp globes

Compartment G

1 metal tripod (double ring, large)
1 metal tripod (triangular)
1 lb. parowax
1 ball string
200 Durham tubes
1 microscope lamp base and upright
½ lb. plasticine
1 Bunsen burner spirit reservoir
1 length metal flexible tubing

Compartment H

2 metal agglutination racks

Compartment I

3×1-pint milk bottles
3 rubber stoppers

Compartment J

4 glass towels
1 duster
1 nail-brush
1 set sewing needles
4 test-tube brushes
1 bottle brush
1 agglutination bath
2 pairs rubber gloves, No. 7½

Case No. 3

Compartment A

1 auto cook kit—petrol stove

Compartment B

2 primus stoves (silent single burner)
1 primus stove (double burner)
1 Fillery cooker autoclave

Compartment C

1 galvanized iron bucket
1 Gem water still

Shelf B

1 paraffin burner (for incubator)
1 „ „ (for agglutination bath)
2 chimneys
1 nest billy-cans

Shelf C

2 foolscap record books

Drawer 1

Spares for primus burners (prickers, etc.)
1 spare valve for autoclave
6 cakes toilet soap
3 boxes matches

Drawer 2

1,000 report forms (blue, small)
500 white envelopes

Drawer 3

1,000 laboratory filing cards

Case No. 4

1 hot-air sterilizer
1 collapsible stand for sterilizer
1 Winkel-Zeiss microscope
1 agglutination board
3 white coats
2 hand towels
1 vol. Manson-Bahr's *Tropical Diseases*
1 vol. Stitt's *Practical Bacteriology, Haematology and Animal Parasitology*
1 vol. Mackie and McCartney's *Handbook of Practical Bacteriology*

Fixtures to Lorry

1 incubator
1 refrigerator, containing :

Agglutinating Sera :

20 × 0.1-c.cm. in ampoules	*B. typhosus*
„ „	*B. paratyphosus* A
„ „	*B. paratyphosus* B
„ „	*B. paratyphosus* C
„ „	*B. aertrycke*
„ „	*B. enteritidis* (Gaertner)
„ „	*B. dysenteriae* Shiga
„ „	*B. dysenteriae* Schmitz
„ „	*B. dysenteriae* Flexner
„ „	*B. dysenteriae* Sonne
„ „	Meningococcus
„ „	*Br. melitensis*
„ „	*Br. abortus*
„ „	Group A serum
„ „	Group B serum

Agglutinating Antigens :

2 × 100-c.cm. bottles	*B. typhosus* H
„ „	*B. typhosus* O
„ „	*B. paratyphosus* A
„ „	*B. paratyphosus* B
„ „	*B. paratyphosus* C
1 × 50-c.cm. bottle	*B. dysenteriae* Shiga
„ „	*B. dysenteriae* Flexner
„ „	*B. dysenteriae* Schmitz
„ „	*B. dysenteriae* Sonne
„ „	*B. aertrycke*
„ „	*B. enteritidis* (Gaertner)
„ „	*Br. melitensis*
„ „	*Br. abortus*
2 × 100-c.cm. bottles	*B. proteus* OX2
„ „	*B. proteus* OX19
„ „	*B. proteus* OXK

Investigations for the diagnosis of the following conditions can be carried out by the laboratory: malaria, trypanosomiasis, kala-azar, oriental sore and cutaneous leishmaniasis, relapsing fever, infectious jaundice, rat-bite fever, typhus group of fevers (epidemic, endemic, typhus-like), plague, melioidosis, undulant fever, enteric fevers, cholera, bacillary and amoebic dysentery, balantidial dysentery, bilharzial dysentery, flagellate dysenteries, leprosy, yaws, mycetoma and blastomycosis, tropical ulcer, veld sore, fungous skin diseases, bilharziasis, filariasis, onchocerciasis, intestinal parasitic infections, myiasis, anthrax, diphtheria, gonorrhoea, meningitis, tetanus, tuberculosis. General bacteriological and pathological investigations can be undertaken, such as pus and exudates for cultural examination, blood counts, blood grouping, bleeding and coagulation times, sedimentation rate, urine analysis, the Kahn test, bacteriological examination of water supplies, examination of water for the commoner poisons, testing of water for chlorination.

In order to facilitate the taking of specimens by medical officers the following tabulated list of all conditions likely to be met with has been drawn up, together with the corresponding investigation which the laboratory can carry out and the nature of the specimen required. The medical officer has thus to make his differential diagnosis and then consult his tabulated list to find out which specimens he has to send to the laboratory and what investigations to ask for.

Specimens required for Investigations carried out by the Mobile Laboratories, S.A.M.C.

Disease	Investigation	Nature of Specimen
Malaria	Microscopical of blood	Thin and thick smears
Trypanosomiasis	Microscopical of blood	Smear
	Microscopical of gland fluid	Smear
	Serum-formalin reaction	Blood (serum 1 c.cm.)
Kala-azar	Microscopical of blood	Smear (thin and thick)
	Splenic or liver puncture	Smear
	Serum-formalin reaction	Blood (serum 1 c.cm.)
Oriental sore and cutaneous leishmaniasis	Microscopical of smear from base of ulcer	Smear
Relapsing fever	Microscopical of blood	Smear (thin and thick)
Infectious jaundice	Acetic acid test on urine	Urine
	Microscopical of urine	
Rat-bite fever	Microscopical of exudate from bite or serous fluid from papule	Smear
Typhus group of fevers: epidemic ; endemic ; typhus-like — tick-bite ; etc.	Weil-Felix agglutination	Serum (1 c.cm.) or whole blood (3 c.cm.)
Plague	Blood culture	Blood in broth with 1% sodium citrate
	Microscopical of sputum ; gland puncture	Sputum, gland fluid (or smear)
	Discharges	Discharges (or smear)
Melioidosis	Microscopical of pus	Smear of pus
	Culture of pus	Pus
	Culture of blood	Blood in broth
Undulant fever	Agglutination test	Serum (1 c.cm.) or whole blood (3 c.cm.)
	Culture of blood or clot	Blood in broth
Enteric fevers	Blood culture	Blood in bile
	Agglutination tests (Widal)	Serum (1 c.cm.) or whole blood (3 c.cm.)
	Faeces and urine culture	Faeces and urine
Cholera	Microscopical of faeces	Faeces
	Culture of faeces	
Bacillary dysentery	Microscopical of faeces	Faeces
	Isolation of organism from faeces	Faeces (our distance, sent in equal vol. of N/33 NaOH or twice vol. of 30% glycerin in 0.6% saline)
Amoebic dysentery and amoebiasis	Microscopical of faeces	Faeces
Balantidial dysentery	Microscopical of faeces	Faeces
Bilharzial dysentery	Microscopical of faeces	Faeces
	Leucocyte and differential count	Blood in oxalate tubes (provided)
Flagellate dysenteries	Microscopical of faeces	Faeces
Syphilis	Kahn test	Serum or blood (4 c.cm.)
Leprosy	Microscopical of nasal scrapings and nodule puncture	Smears
Yaws	Microscopical of smear from lesion	Smear
Mycetoma and blastomycosis	Microscopical of pus (granules) and smear	Smear
Tropical ulcer	Smear from ulcer	Smear
Veld sore	Culture of swab from sore	Swab
	Microscopical of smear	Smear
Fungous skin diseases	Microscopical of hair, scales, etc.	Hair, scales, etc.
Bilharziasis	Microscopical of urine and faeces	Urine, faeces
	Leucocyte and differential count	Blood in oxalate tubes (provided)
Filariasis	Microscopical of blood	Thick smears
Onchocerciasis	Microscopical of extract from portion of skin near nodule	Portion of skin near nodule
Intestinal parasites: ankylostomiasis, cestodiasis, etc.	Microscopical of faeces	Faeces
	Blood count	Blood in oxalate tubes (provided)
Myiasis	Microscopical of larvae	Larvae (and adults if possible)
Anthrax	Microscopical of exudate	Smear
	Culture of exudate	Swab
Diphtheria	Culture	Swab
Gonorrhoea	Microscopical of pus	Smear
Meningitis	Microscopical of pus	Smear
	Culture of cerebrospinal fluid	Cerebrospinal fluid
Tetanus	Culture of tissue	Tissue
Tuberculosis	Microscopical of sputum	Sputum
General	Pus, exudates, etc., for bacteriological exam.	Pus, etc.
	Blood counts	Blood in oxalate tubes (provided)
	Blood grouping	Whole blood (not treated)
	Bleeding and coagulation time	Patient
	Sedimentation rate	Blood in oxalate
	Urine analysis	Urine
	Bacteriological examination of water	Water in sterile bottle
	Testing for poisons in water	Water
	Water testing for purification	Water

The personnel consists of medical officers, technical assistants, drivers, and batmen. The medical officers possess postgraduate diplomas in public health, tropical medicine, and bacteriology, and have had laboratory experience. The technical assistants have undergone training in a pathological and bacteriological laboratory. By having medical officers with public health and tropical

medicine and hygiene diplomas the use of the laboratory is extended. They are qualified to advise in the investigation and control of an outbreak of disease and can advise on matters of hygiene.

If full use is made of the laboratories and their personnel the work of the Army medical and hygiene officers should be considerably easier and the morbidity and mortality rates of the Forces in the field be considerably reduced.

Two of these mobile laboratories have been organized and staffed by the South African Institute for Medical Research and handed over to the South African Medical Corps for service in the field.

We wish to thank Colonel A. J. Orenstein, C.M.G., Director-General of Medical Services, for his approval and encouragement in the carrying out of the work and for his permission to publish these notes; Mr. J. de Bruijne for his technical assistance; Mr. W. A. J. Cameron, manager and secretary of the South African Institute for Medical Research, under whose auspices these laboratories were equipped and constructed, for his advice, encouragement, and unlimited help; the authorities of the S.A.M.C., who allowed us a free hand in the construction; and Messrs. Wevell Brothers, Johannesburg, for their courtesy and efficiency in the building of the lorry bodies.

ANTISEPTICS IN WARTIME SURGERY

In a lecture to the Pharmaceutical Society on November 14 Prof. ALEXANDER FLEMING, whose subject was "Antiseptics in Wartime Surgery," defined an antiseptic as an agent that would interfere with the growth of bacteria without of necessity killing them, though most of the tests for the potency of antiseptics took account only of their bactericidal properties. The specificity of some modern antiseptics was considerable. The effect of a given chemical upon two different kinds of streptococci differed markedly, and in the case of organisms less closely related the differences in inhibitory power were still more evident. The medium in which the antiseptics were tested also made a difference. In the case of merthiolate tested in nutrient broth a dilution of 1 in 1,000,000 inhibited the growth of the staphylococcus, but in blood a strength of 1 in 1,000 was needed to inhibit. The best medium for testing antiseptics for surgical purposes was blood.

The fate of the antiseptic in a septic wound had to be considered. In the last war a popular type of antiseptic was represented by the hypochlorites. Dakin's fluid, chloramine-T, was much used, and by Carrel's method was applied for two hours with a special series of tubes. But it was necessary to discover for how long the hypochlorites remained active in the wound. A test showed the time to be only ten minutes, so that for one hour and fifty minutes, in Carrel's treatment, there was no antiseptic in the wound at all. Some of the violet and green dyes had been much used in surgery. A point to bear in mind in connexion with dyes was their affinity for the dressings placed on a wound. Prof. Fleming conducted an experiment with gentian violet in which he showed that on pouring some of this violet dye into a test tube it was completely absorbed by the cotton-wool plug. The affinity of some dyes for cotton-wool was greater than their affinity for bacteria.

The Sulphonamide Group

Prof. Fleming went on to discuss the newer antiseptics as represented by the members of the sulphonamide group —sulphanilamide, sulphapyridine, and sulphathiazole. These were not general antiseptics. They acted specially on certain micro-organisms and had little or no action on some others. Moreover, their action was not so much a killing one on the bacteria as a stopping of their growth. The bacteria were not killed by the drugs except in high concentrations, but their growth was stopped, and the killing was done by the leucocytes in the blood.

Certain conditions influenced the action of these drugs both in the test tube and in the body. They were influenced by the state of immunity of the body. The number of bacteria present and the introduction of a number of dead bacteria with the living ones had an enormous influence on the effect of these drugs. The presence of peptones, again, hindered their action, and pus fluid had been shown completely to neutralize them. Recently he took some pus from a wound in the chest, centrifuged it so as to obtain the clear fluid, heated and diluted it, and then added a mixture of sulphapyridine and blood, the sulphapyridine being of the strength that would just inhibit bacteria—namely, 1 in 40,000. When there was no pus fluid no growth of bacteria was obtained, but with pus fluid even diluted more than one hundred times good growth was obtained and the action of the sulphapyridine on the streptococci completely inhibited. On theoretical grounds the sulphonamides should not be very good antiseptics for wounds that were really septic.

It was apt to be supposed that the drug of choice for streptococcal infections was sulphanilamide, for pneumococcal infections sulphapyridine, and for staphylococcal infections sulphathiazole. Actually sulphathiazole was the most potent of the three, acting more strongly on all micro-organisms, and sulphapyridine was better than sulphanilamide. From diagrams which he showed to illustrate the comparative potency of these drugs it appeared that sulphapyridine was ten times more potent than sulphanilamide against the haemolytic streptococcus, and that sulphathiazole was more potent still. Sulphanilamide did not affect staphylococcal infections to any great extent in the body, but there was every reason to suppose that sulphathiazole affected them; a considerable inhibition was obtained with 1 in 60,000 sulphathiazole. In using these drugs in war surgery, however, the question of solubility came in. The usual method of application was to powder them on a wound, and one then obtained in the wound a saturated solution of the drug. With sulphanilamide the saturated solution was obtained at about 1 in 100; with sulphapyridine at about 1 in 1,000; and with sulphathiazole at over 1 in 2,000. Therefore, although the last two drugs were more potent than sulphanilamide, a higher concentration of sulphanilamide was obtained in the wound, so that the ultimate result might not, after all, be very different.

Penicillin

Recently another chemical had come under discussion This was not a new chemical, but it was something of unknown composition made in the growth of a mould and named "penicillin." It had been used in the laboratory for over ten years as a method of differential culture and in a few cases as a local antiseptic. The drug had recently come to the fore again, workers at the Sir William Dunn School of Pathology at Oxford having got a method of extracting the active principle, not in a pure state, but as a solid mixed with some coloured body. He had obtained some of this material from Oxford and tested it against the sulphonamides. Weight for weight penicillin in the impure state was a very strong antiseptic, inhibiting some bacteria over a wide area. In estimating the comparative bacteriostatic effect against haemolytic streptococci complete inhibition was obtained with penicillin in a strength of 1 in 800,000, as compared with 1 in 200,000 with sulphathiazole. Against the staphylococcus also penicillin acted in dilutions much weaker than sulphathiazole and sulphapyridine. It was not influenced, as sulphonamide was, by large numbers of bacteria, by peptones, and by other conditions so as to nullify its effect.

Penicillin had not yet been tried in war surgery with contaminated wounds, nor would it be tried until some chemist came along and found out exactly what it was and manufactured it. Probably it was quite a simple chemical, and if it could be made in the same way as sulphanilamide was made it was likely that the popularity of the sulphonamides would diminish and their place be taken by penicillin.

Prof. Fleming concluded with a reference to the dusting-on process for applying sulphanilamide powder to wounds

infected with streptococci. Colonel Leonard Colebrook claimed that by this method he was able to kill off the haemolytic streptococcus in a few days. In this way the sulphonamide compounds were proving effective in wounds which, while not very septic, contained too many streptococci to heal quickly. An enormous amount of good could be done by means of sulphanilamide dusted on as a powder.

AIR-RAID CASUALTY SERVICES

THE PERIOD OF TESTING

The air-raid casualty services in London have passed through a period of nearly three months of urgent testing. That they have met the occasion so well is due partly to the previous planning and rehearsal, but even more to the courage and resource of the men and women enlisted. At the same time it is not to be wondered at if some creaks in the machinery have been heard.

The three components of the services are the first-aid posts, the mobile units, and the casualty receiving hospitals. Experience has shown that there is a function for all three, but also for another service which is a modification and auxiliary of the mobile unit—namely, a car with doctor, nurse, and perhaps two stretcher-bearers and containing an emergency supply of morphine and equipment to enable the easier removal of injured people. This has been evolved by medical officers in the service because it has been found that often the larger mobile unit cannot get near enough to the scene in the havoc and confusion following a bomb explosion, and also because the victims may be so severely injured that the only thing to be usefully done is to give them a morphine injection and send them by ambulance direct to hospital.

The First-aid Post

The first-aid posts, for various reasons, have not been used as much as was expected. The medical officer in charge of one post, in a district which has been rather heavily bombed (there was a large crater just outside the entrance gate and another a little way down the road), stated that only once in three weeks had he had a string of casualties. In other districts the posts and mobile units are busy whenever the raids are at all heavy, whether by night or day. Every night also there are isolated cases of mishaps in the black-out—not infrequently a fall down the shelter steps—and the posts are also appealed to when there are cases of early or suspected illness in the shelters.

One of the reasons for the comparative non-use of some first-aid posts is that immediately after an "incident" the injured are sorted out by stretcher parties, who cannot be expected, especially in such conditions, to know whether the injuries are trivial or severe. The injured are generally rescued in a state of filth out of a vast heap of rubble and glass; they are badly shocked, and perhaps have cuts, bleeding freely, on face, head, and arms. Their ghastly appearance suggests a "hospital case," whereas many of them would be more conveniently received at the first-aid post. The treatment at the post chiefly consists in washing the patients, dressing their wounds, giving them a warm drink, and generally comforting and reassuring them. In some they are tucked up on stretchers; in others, laid on cushioned benches. Their nerves are quieted with a mild sedative such as bromide. It must be remembered that many of them have no homes to return to, and some of them have seen their husbands or wives killed before their eyes, or their fate is unknown.

Casualties fall very largely into two categories: those who are killed outright or very badly injured so that some of them die before they get to the first-aid post or hospital, and those who suffer from relatively slight injuries accompanied by shock. At most of the posts there have been a number of cases of fracture due to falling masonry and some bad injuries due to glass. Many scalp and face wounds have required attention, and, at the other extreme, sprained ankles and dislocated knees. Head and face injuries occur largely in those who have met the effects of blast in the street; the fractured extremities in those who have been in falling buildings. A good many cases of broken arms have been forthcoming, the arms having been held in front of the face to protect it when explosion was imminent. Concussion of a mild type has been frequent. Partial or complete suffocation has been found in people who have been buried, perhaps for hours, in the basements of buildings. The air passages become choked with dust and soft material, and a kind of silicosis effect is produced.

Allocation of Cases

The first-aid posts were originally intended for the slightly injured, especially walking cases, but the character of the cases received depends to a large extent upon the accessibility of the post from the scene of the incident, the suddenness of the attack, and the practice of the rescue and stretcher parties. Every casualty, even though the injuries be only slight, suffers from some degree of shock. It has happened that extremely shocked cases have died on the way to hospital, although their injuries were not of themselves likely to have proved fatal. It is important to deal with the shocked condition immediately by allowing the patient to remain on the stretcher wrapped in blankets and with hot-water bottles (which are now being issued to stretcher parties) until he is fit for removal to hospital. But here it is a choice between two evils, for heavy bombing may be going on which may make his instant removal desirable. The work of rescue and first aid has to be carried out with great speed, not merely because of the condition of the victims but because bombs may be falling, buildings may be in a state of collapse, or there may be a big fire in the vicinity.

The work done at first-aid posts depends very largely upon the initiative and impromptu organization of those in charge. In one case at least the staff are not content to stand and wait; when bombs are heard to fall in the neighbourhood members of the stretcher party who are not on duty at the post go out in a small car to find the incident, and if there are casualties they report at once to the doctor at the post, whose aid is therefore available more quickly than if he waited in the prescribed official manner for intelligence from the A.R.P. control. In this way they overcome the time lag between the incident and the summoning of medical aid.

The Mobile Unit

The mobile units in the form of vans or lorries converted or specially built for the purpose of carrying full equipment for dealing with the injured were intended for use when more than a few casualties were expected, more particularly if the local hospital was placed out of action. They carry everything required for an emergency operation, and have proved their worth many times over. Their use is enhanced if the doctor is already on the scene of the casualty before the unit arrives. When people are trapped in a building they often receive severe crush injuries, and the instant they are reached by the rescue squad a doctor should be available to give them an injection or perhaps to put on temporary splints and bandages to enable them to be moved with the least possible risk.

Up to now there has been some difficulty in deciding when to call out the mobile unit. There is a natural desire to keep the personnel from being subjected unnecessarily to bombardment; on the other hand, there have been occasions when the mobile unit has turned up after a number of cases have already been snatched away to hospital. Once again the matter turns upon the judgment of those who first see the injured. Many of the cases, although they look extremely ill when first seen, pick up quickly, and on arriving at hospital, apart from dirt and dishevelment, there does not appear to be much wrong with them. The key to the question is the warden's report. The wardens have had a certain amount of instruction in first aid, and their natural instinct is to apply it to the injured, but their real business is to report the case and summon medical aid. It would be a good thing if it could be arranged to have a doctor in charge of each stretcher

party when it is called out; in other words, to have him summoned as automatically as the rescue squad. He would then be able to make a rough assessment of the injury, direct minor cases to the first-aid post, and prevent the hospital from becoming loaded up with them.

Rescue and First Aid

To attend the injured at the scene of an incident calls for agility as well as courage. In one case when a block of flats was demolished a doctor and nurse had to climb down an iron ladder through a manhole 18 in. square in order to give an injection to a trapped person. It has often been necessary to attend the injured at the bottom of a crater while debris is still falling. In one demolition two people were trapped in a basement. The rescue party, with the doctor, worked all night, but both people were dead on liberation, one of them having died only a few minutes before. Very generally the trapped people when uncovered are severely swollen, which makes it impossible to ascertain the extent of injury. The difficulty of the work is heightened enormously by the darkness and the impossibility of telling whether remaining walls are likely to collapse.

One great need in this first-aid work is an easier method of administering morphine. The doctor's hands, after he has clambered over or under piles of ruins, are extremely dirty and quite unfit to handle the syringe which he carries in his pocket. What is wanted is the issue of an ampoule with the needle attached in such a way that as soon as the ampoule is broken its contents can be automatically injected into the patient. Rather large doses of morphine are often necessary. The ordinary ampoule corresponds to 1/3 grain, but more often 2/3 grain is given, sometimes repeated two-hourly. Large doses of morphine would not be necessary if it could be compounded with hyoscine–phenobarbitone; but that is issued in tablet form, and there is no opportunity when dealing with these casualties, perhaps thirty feet down in a crater, to handle rubber-stoppered bottles and dissolve tablets. The medical officers often supplement from their own resources the preparations officially supplied. Coramine (nikethamide) is another drug which should be carried for those suffering from heart failure, and oxygen should be in the ambulance or mobile unit.

Suggestions

1. The first-aid posts, the mobile units, and the stretcher parties should be encouraged to work as one unit. The doctor should be the leader of the stretcher parties, so that these bodies of laymen are not left themselves to do the rough diagnosis and sort out the wounded. The wardens, even though they have received some first-aid training, should be firmly instructed that their first and most important duty is to report.

2. Some form of follow-up is highly desirable in these cases. If a report could be made from the hospitals back to the first-aid post or the mobile unit as to the condition of patients when they arrive at the hospital it would help those in charge of the emergency first-aid services to proceed more confidently. At present those in charge of first-aid posts and mobile units do not know what happens afterwards to the people to whom they gave the first treatment. If some report were made to them they would be able to judge how far their measures were successful or needed revision.

3. Doctors and nurses should have an issue of warm serviceable overwear and boots. Their own clothes are often ruined as a result of the conditions under which they have to work. The issue of drugs might also be extended, and morphine ampoules be provided in a form which would obviate the use of a syringe.

It is not possible to leave this subject without a word of wholly inadequate praise for the doctors, nurses, and stretcher-bearers who work regardless of returning bombers and falling debris, not to speak of dirt and darkness, and also for those in the institutions, the "shock teams" and others, who disregard all personal convenience and forget fatigue in ministering to the wounded on this strange "home front."

Reports of Societies

THE POTATO AS A WARTIME FOOD

Discussion by Nutrition Experts

A discussion on the potato as a food in wartime was arranged by the Nutrition Panel of the Food Group of the Society of Chemical Industry, and took place at the House of the British Medical Association, Tavistock Square, W.C.1, on November 13. The chair was taken by M. ANDRÉ SIMON, described as a distinguished gastronome, and the opening papers dealt with the biology of the potato, its nutritive value, and its chemical composition.

Biology of the Potato

Dr. R. N. SALAMAN, F.R.S., director of the Potato Virus Research Station, discussed the biology of the potato. It was not, he said, due to accident or to the vagaries of fashion that the potato had attained its pre-eminent position in the dietary of peoples of the temperate zone. Indeed, it had been an uphill fight against custom and prejudice before the working people of this country accepted it. The victory of the potato was due to certain biological characteristics, one of which was its genetic variability of response to longer or shorter exposure to daylight. There were types of potato which formed their tubers only in a short-day environment, while others, like the English varieties, needed a daylight of sixteen or more hours to produce their fullest return. More important still was another virtue. While all other important vegetables and foodstuff plants such as cereals were raised each year from seed, which gave rise to the appearance of variants, the potato, because it was propagated by tuber—that is to say, vegetatively—reproduced itself without variation, so that once a particular type was chosen because of some advantageous quality that quality was secured for all time by merely planting the tubers from season to season.

Quality in a potato meant different things to different people. To the caterer it implied a potato the taste of which was neither too pronounced nor too insipid. The tuber on boiling must not collapse nor yet emerge from the pot like a piece of cheese. If chipped or crisped it must take a rich golden-brown colour, have a firm to brittle texture, and not absorb too much oil in cooking. A good-quality potato for boiling was unlikely to be a good-quality "frier."

The potato was subject to certain diseases. Wart disease was caused by a fungus, but certain varieties were immune from attack and could be grown with impunity on the most infected soils. Blight was due to infection by another fungus, and the only method of control in general use was the spraying of growing plants with copper fungicide. Virus disease was caused by ultramicroscopic viruses which were conveyed from the sick to the healthy plant by green-fly. The annual loss in Great Britain due to virus disease was estimated at 30% of the potential crop, or nearly two million tons per annum. The only control was the provision of virus-free potato seed.

Dr. Salaman concluded by saying that the potato was a vital bulwark against want in time of war, and the conversion of the potatoes of this country from a mixed-healthy, quasi-healthy, and virus-infected stock into a high-yield healthy stock ranked among the most urgent of war tasks.

Value of the Potato in Nutrition

Miss HARRIETTE CHICK, D.Sc., of the Lister Institute said that the potato at the present time was of special importance as a partial substitute for bread and imported cereals. Its calories and carbohydrate content, reckoned on a dry-weight basis, were of about the same order as those of white or wholemeal bread; the protein was lower in amount but of good quality. She gave from MacCance and Widdowson a table showing the average composition of the potato compared with white and wholemeal bread, of which the following is an extract:

	Reckoned on Dry Weight		
	Calories per 100 gm.	Protein* %	Carbohydrate %
Raw potato	393	7.9	87
Potato peeled and boiled ..	435	6.6	98
White bread	382	10.6	79
Wholemeal bread	363	12.0	70

* Reckoning all nitrogenous matter as protein.

Of minerals, potassium was higher than in cereals, calcium lower; and available phosphorus and iron about equal in amount to that in white though lower than that in wholemeal bread.

On a potato diet about 5% of the total calories remained undigested; the loss in nitrogen varied from 15 to 30%. The amount of nitrogenous substances varied, but generally formed about 2% of the fresh weight of the potato or 8% of the dry weight. Of these about three-fifths were protein in nature, and the remainder consisted of simpler nitrogenous compounds, including some amino-acids. Although the proportion of protein was relatively low the nutritional value of the total nitrogenous constituents must be high, for the results of human experiments had shown that nitrogenous equilibrium could be maintained on diets in which the potato was the sole source of nitrogen even when the amount ingested provided only 4 to 8 grammes of nitrogen a day. The speaker instanced the experiments of Rubner and Thomas and of Rose and Cooper, the latter workers reporting that nitrogenous equilibrium was obtained with a woman subject of 50 kg. weight, who derived the nitrogen of her diet—4.97 grammes—daily from 1,500 grammes of potatoes.

Vitamin Content

Turning to the vitamin value of the potato, Miss Chick said that it formed no vehicle for fat-soluble but it was a useful source of water-soluble vitamins. Although not among the foods richest in vitamin C, and notwithstanding the losses caused in cooking, the relatively large amounts regularly consumed made the potato of great importance as an anti-scorbutic food in winter. The value of the vitamin C content was similar to that of the carrot but lower than that of the turnip and many leafy vegetables. The losses during cooking in water were due to diffusion as well as to destruction of the vitamin, and the advantage of steaming as a method of cooking was evident. Slow methods of cooking or long periods of "keeping hot" might cause the vitamin to be almost totally destroyed. The content of vitamin B_1 (aneurin) in the potato appeared to be greater than that in white and about equal to that in wholemeal bread. Little information was available about the content of other B vitamins in the potato. Nicotinic acid was present in only negligible amount, and the potato had been found of little use in preventing pellagra.

Further evidence, which could not be marshalled in the same precise fashion, indicated the importance of potatoes in the dietary. Their value as a preventive of scurvy in winter was shown by the serious outbreaks of scurvy which followed the failure of the potato crop in Ireland in 1847, and it was stated that all epidemics of scurvy in Norway in the nineteenth and the early twentieth centuries had a similar history. Certain facts also showed the advantage of substituting potatoes for cereals in securing the better utilization of calcium and phosphorus for nutrition of the teeth. In the *British Medical Journal* (1926, **2**, 399) Dr. E. H. Marshall reported on an examination he had made of the teeth of over one-third of the natives of Tristan da Cunha, who consumed a diet in which potatoes were the principal source of carbohydrate and milk was also abundant; no grain was grown on the island. He stated that he found a remarkable freedom from dental caries even in persons of middle and old age. There was enough evidence, Miss Chick concluded, to suggest the desirability of substituting potatoes for some at least of the cereals in any given diet.

Cooking Changes

In a most exhaustive paper, embodying more than two hundred references to the literature of the subject, Mr. H. LAMPITT and Mr. N. GOLDENBERG of J. Lyons and Co. discussed the composition of the potato and the losses in various constituents which took place on cooking. These losses depended on the methods of cooking used. Unpeeled potatoes lost less than peeled ones; steaming caused smaller losses than boiling. Soaking preliminary to cooking or slicing increased the losses, and nitrogen losses became greater when potatoes were placed in cold water and brought to the boil instead of being placed directly in boiling water. Baking and frying had been observed to cause smaller losses than boiling or steaming.

As to the behaviour of the vitamins of the potato on cooking, many investigators had found the vitamin C content to decrease considerably, owing mostly to its being leached out by the boiling water. But here again the losses varied with the methods of cooking used. Little was lost if the potatoes were cooked in their skins. Rapid boiling had been found to be better than slow boiling for a longer time, and steaming caused smaller losses than boiling. Boiling in salt water reduced the losses. It had also been found that the loss of vitamin C increased with time of standing in the cooked state because of atmospheric oxidation. Losses of vitamin on frying were considerable, presumably owing to destruction at the temperatures used. The available evidence about vitamin B_1 was conflicting, some investigators stating that no loss occurred on cooking, others that there was a definite loss.

The cooking quality of the potato and particularly its texture had been the subject of a number of investigations. There was said to be a positive correlation between starch content and mealiness, but this rule was not invariable. Mealiness was influenced by environmental and storage conditions and by cultural practices. Low storage temperatures diminished mealiness, and relatively high cooking temperatures and escape of water from the cooked product increased it.

The CHAIRMAN remarked that he had never found in the cookery books an account of the proper way to boil a potato. The mealy potato should be put into boiling water, the waxy potato into cold water and brought to the boil. The potato should not be left until the fork could be put into it. After the cooking had been half done the water should be drained off, a cloth put on the top, and the potatoes left on cooking in their own steam. He described the potato as a non-aggressive vegetable, not pressing its taste or flavour on the eater, contrasting in this respect with the turnip, parsnip, and artichoke; very few people, indeed, could describe the taste of the potato.

Food Habits

In the general discussion Professor J. C. DRUMMOND said that the difficulty of increasing the consumption of the potato lay in the conservatism of the food habits of the people. This conservatism had been demonstrated in connexion with canteen meals, where the slightest departure from the ordinary kind of dish was regarded with suspicion. The consumption should be raised to 14 oz. per head per day, which would mean either a good helping once a day or eating potatoes at two meals. He praised the nutritive value of "fish and chips." Other speakers mentioned as a deterrent the conservatism not only of the eater but of the grower.

A speaker from the National Institute of Dairying gave an account of his personal experience of a diet in which the potato was almost the exclusive source of nitrogen and calories. The diet consisted of 1,500 grammes of potato daily, with 120 grammes of fat. On this he and a colleague lived for 167 days, and in both cases they managed quite well. He lost three kilogrammes in weight, but as it was in the spring when he increased his physical activities he did not think this was solely the result of the diet. At the end of the period he could run a quarter of a mile and swim a hundred yards in quite creditable time. The interesting thing was that neither he nor his colleague became tired of the diet, and when at last he broke his fast by eating a cheese sandwich he started his next meal with a generous helping of fried potatoes!

The variation in vitamin content of the potato was one point raised in the discussion. One speaker mentioned a variation in vitamin B_1 ranging from 23 to 53 international units per 100 grammes, such variations sometimes pertaining to one particular lot, with nothing to indicate the reason

for them. Another speaker described vitamin C as the most important constituent of the potato, saying that many people depended on the potato for their entire source of vitamin C, and that if the potato were cut out of the diet of English people large numbers would develop scurvy. There was a large destruction of vitamin C on steaming the potato; as great a loss as 50 per cent. of the ascorbic acid had been noted. In boiling, on the other hand, the destruction was very small—from zero to 10 per cent.

Correspondence

Owing to heavy pressure on space, correspondents are asked to make their points briefly. A number of letters received for publication have had to be held over.

Treatment of Air-raid Casualties

SIR,—Some of the most trying cases to deal with among air-raid casualties are those due to splintered glass. In a recent batch of cases with which we had to deal seventeen out of twenty-two were due to this cause alone, and while all were suffering from some degree of shock six of them were in a very grave condition. It took more than four hours' resuscitation treatment in the wards before any one of these could be dealt with surgically, and during this time every available method for combating shock was utilized. Plasma was given to each, followed by whole blood where indicated.

The injuries in these cases were so multiple that primary excision of wounds was out of the question. It would undoubtedly have re-established shock if it did not result in fatalities. All that was done in this direction was the excision of frayed edges of skin. For the rest the wounds were cleansed by douching and gently swabbing with saline and hydrogen peroxide followed by surgical spirit. Punctured wounds were enlarged to admit the tip of the finger—in some cases a more certain way of locating a track than by probing. All tracks were followed to their termination, and foreign matter—glass, debris, and pieces of clothing—removed. Some of these wounds had penetrated deeply; one in the neck had reached the bodies of the vertebrae, fortunately without injuring any important structures. Another in the arm had partly severed the brachial artery and median nerve and completely divided the ulnar. A third, with only a tiny punctured wound on the surface, had slit the erector spinae group of muscles for a distance of approximately fourteen inches. The case in which the brachial artery and nerve had been injured also suffered from multiple cuts, one of which had partly amputated the breast on the left side. In this case a tourniquet had been applied to the arm, but was immediately released on admission to hospital. Blood spurted briskly from both ends of the artery. Forceps were applied and the hand gradually regained its warmth. At operation the vessels were double-ligatured and divided. This apparently had no effect whatever on the circulation of the hand. The ends of the nerves were drawn together with fine silk.

With the exception of one doubtful case, glass splinters did not penetrate bone. In this case the left eyelid and the eyeball were severely damaged, and *x*-ray examination showed a small foreign body in the skull, possibly a piece of glass, as the shadow did not seem defined enough for metal. The foreign body may, of course, have gained entrance by way of the sphenoidal fissure.

Sulphanilamide powder was not used in treating any of the wounds, but all patients were put on a course of sulphapyridine by mouth. Sickness caused by the drug was counteracted by tablets of nicotinic acid. All these cases have made good progress and their wounds have healed with the exception of the arm case, the very case where one was most anxious to avoid sepsis. This case progressed so favourably at first that sulphapyridine was discontinued on the fourth day. In the course of forty-eight hours the temperature rose steeply to 102°, the patient felt ill, and the arm began to discharge. The temperature remained high until sulphapyridine treatment was resumed, when a rapid change for the better ensued. The temperature is now normal and the discharge has ceased.

Compound fractures of the limb were treated on the principles above outlined. Where necessary pin extension was used and the limb encased in plaster.

Wounds of the abdominal wall caused by glass splinters, however apparently trivial, must be thoroughly investigated. In another series of cases there were three good examples where the wounds were small with a little fat presenting, which on further examination proved to be omentum. The glass splinters had gashed their way through the muscles. In one case there were multiple lacerations of the small intestine; in another lacerations of the caecum; and in the third case rents in the mesentery of the small intestine. In the case of the lacerated small intestine there was no escape of bowel contents; the bowel wall was contracted and firm and the mucous membrane pouted in a rosette-like fashion. In the case of the caecum there was escape of the bowel contents with a definite odour.

The importance of *x*-ray examination in head injuries is illustrated by the following case:

> A patient was admitted with strong retraction of the head in a condition which might be described as one of status epilepticus. On examination a definite depression of the right parietal bone was discovered. Morphine was unsuccessful in quieting the patient, so he was given a few cubic centimetres of intravenous pentothal and the fits immediately ceased. The head was shaved, but as there was no bruising and there did not seem to be a sharply defined edge to the depression an *x*-ray photograph by portable apparatus was taken. The *x*-ray film showed no depression whatever of the inner table of the skull, and operation was deferred. The patient has since made a good recovery.

In cases of severe injury the giving of morphine hypodermically is in my opinion useless. It should be given intramuscularly, and, if this does not appear to be effective, then it can be supplemented by some more given intravenously. Morphine in liquid form ready for injection should be kept in ampoules or rubber-capped bottles. A convenient way of doing this is to inject the solution into the tube of the intravenous apparatus. When given intravenously the injection should be made slowly and careful watch should be kept to see that the patient's respirations do not sink unduly.—I am, etc.,

London, W.1, Nov. 15. MICHAEL J. SMYTH.

Shock of the Ambulance Journey

SIR,—The letter from Mr. D. G. Duff (November 9, p. 647) concerning the shock of an ambulance journey deserves serious consideration. In this connexion it is interesting to compare the methods of disposal of A.R.P. casualties in two adjacent areas. In one district, when the first-aid parties are summoned, the mobile unit medical officer proceeds at once by car to the scene of the incident. Here he is in a position to grade the casualties and supervise their disposal. Badly shocked cases receive an injection of morphine *before* their ambulance journey, and if it is considered necessary to summon the mobile unit to the incident the medical officer, being on the spot, can choose a site for the unloading of the unit before it arrives, thus cutting delay down to a minimum.

In the other district leaders of first-aid parties are instructed to load serious casualties into the ambulances and send them direct to hospital. They are encouraged to take the responsibility of deciding themselves which cases should be dealt with thus, and for committing these cases, without morphine, to what may be an eight-mile ambulance journey. This procedure has been followed in a number of cases, while the mobile unit has done nothing more than "stand by."

I do not think any comment is necessary on the relative merits of the two methods.—I am, etc.,

Tonbridge, Nov. 12. W. H. POOLE.

Realism in First-aid Instruction

SIR,—Mr. D. G. Duff's letter on realism in first-aid instruction (November 9, p. 647) has interested me, as in the early months of the war I gave the staff here a refresher course in first aid and used a similar system to that of Mr. Duff. Besides the nursing staff, engineers, gardeners, and domestic staff of the hospital attended the lectures, so in order to give them practice in finding the injuries in, say, an unconscious or

shocked patient, I concealed cracked single divisions of Gooch's splinting under the patient's clothing, fastened to the skin by adhesive plaster. Crinkly cellophane paper off cigarette packets stuck over the ribs gave the impression of crepitus; red wool partially concealed in the hair acted as a scalp wound; and coloured cardboard strips strapped to the limbs indicated venous and arterial haemorrhage. Dusting powder with a few drops of oil over the face gave quite a passable impression of shock, and a spot of lipstick just inside the ear indicated cerebral haemorrhage, while anywhere else it was a superficial abrasion.

The class found all this both entertaining and very instructive in learning how to examine a patient for more than the obvious lesion before moving him. One of the advantages in using Gooch's splinting to represent a fracture is that if a small piece of this is broken through to the cloth backing and applied over the clavicle it will straighten out and knit together again when the "fracture" is given first-aid treatment.—I am, etc.,

The Manor, Epsom, Nov. 11. JOHN F. R. GOODLAD.

Tetanus Antitoxin for Civil Casualties

SIR,—I would like to ask whether the official directions to give injections of tetanus antitoxin to every air-raid casualty with a wound contaminated with soil or debris—directions rather widely interpreted—are wise or necessary. The advice, I imagine, is based on the experience of the last war, when wounds were contaminated with soil from agricultural cultivated land. Is there any evidence that wounds contaminated with London soil in this almost horseless age if untreated with tetanus antitoxin are likely to develop tetanus? In my medical experience of over forty years, more than thirty of which have entailed daily attendance at hospital, I have met with only three cases of tetanus—one in an infant, the second in a middle-aged man, the third in a case of criminal abortion. In no case—except the last, which was certainly not due to direct contamination with soil—do I know the source of infection. The first two cases were in what may be referred to as the age of horses. I do not think the experience of other men practising in London would be very different from mine.

I raise the question because in my limited experience of wounds caused by air raids, in victims and rescuers, I have dealt with a rescuer who received an antitoxin injection after a slight wound, and was, as the result of the injection, rendered incapable of work for a week, at the beginning of which there was troublesome sickness and faintness. Through others, medical and lay, I have heard of similar cases. But one has not to consider only these early effects. Such an individual sensitized to horse serum may suffer unpleasant and even serious effects should circumstances later call for the use of an antitoxin.—I am, etc.,

London, W.8, Nov. 11. HAROLD H. SANGUINETTI.

The Problem of the Shelters

SIR,—Through the kindness of a medical friend in lending me copies of your issues of November 2 and 9, I have read with considerable interest the several articles and letters contained therein on the wide subject of air-raid shelters. It was particularly interesting to read the medical points of view. I venture to submit this contribution in the hope that you may accept one on this vital matter from a non-medical man.

The danger of epidemic is obviously gravely exercising medical minds at the present time, and doubtless arises chiefly from two causes: herding of the population in air-raid shelters and the sanitation problem. The former is possibly the graver danger, and forcibly demonstrates the necessity for the prevention of herding, which is at the same time the accepted method of minimizing the physical casualties of enemy air attack. Some of your readers appear to be impressed with the so-called bomb-proof-shelter policy urged by the self-styled A.R.P. Co-ordinating Committee, who, however, only claim their shelter to be proof against 500-lb. bombs. Adoption of such a policy would increase herding, and would develop enemy penetration bombing. The latter would bring in its trail the general use of heavier bombs by the enemy, which, of course, we could not prevent. But we can and do prevent horizontal intensification.

Where deep shelters are available and feasible they should of course be taken advantage of. The line of policy should be to encourage dispersal by every means possible, and not unduly to encourage herding. As a result of considerable technical study of the shelter problem, of which I have also been able to see something in France and Germany, I have formed the conclusion that the supremely important essentials are adequate shelter protection inside the home with sleeping facilities. When this is provided the grave concern of the medical profession will be greatly minimized.

May I now refer to the sanitation problem? The Government is blamed for much, but it has been a matter of considerable surprise to me that the medical profession have not raised their voices months and months ago. It has been obvious, and still is, that greater reliance will have to be placed on conservancy sanitation for shelter purposes and in the certain event of sewer damage. This raises a tremendous public health problem. Crude methods up to now have very largely been adopted, apparently in the belief that they would never be used, and they should not be permitted. Only methods involving complete sterilization of the faecal material should be allowed. Caustic is, I believe, the only economic means of doing this, but it can only be used in containers with anti-splash devices. The percentage of these that have been installed is infinitesimal. The subject of effective conservancy sanitation should be given the most urgent consideration of the medical profession and public health authorities.—I am, etc.,

Rugeley, Staffs, Nov. 15. H. MASON.

Spread of Tuberculosis in Shelters

SIR,—In my area we have knowledge that a number of positive-sputum patients use the public shelters for protection throughout the nights.

Surely the right policy for those who have refused institutional treatment is to replace the Anderson shelter by strengthening a room in their homes. My local authority has adopted this suggestion, and proposes removing the Anderson shelters from the houses of notified cases when the other form of protection is provided. Thus we hope to reduce the use of public shelters by patients where they are an obvious danger to others, and also reduce the risk to their own health by eliminating the use of an outside shelter during the winter months.—I am, etc.,

H. C. MAURICE WILLIAMS,
Southampton, Nov. 11. Medical Officer of Health.

Morphine and Air-raid Casualties

SIR,—With reference to Dr. E. B. Grogono's interesting letter (November 9, p. 643) I submit the following suggestions for the administration of hypodermic injections of morphine under difficult circumstances. I do this with deference, since up till now I have not acted at the site of devastation, while Dr. Grogono has evidently been in full action for several weeks. One would wish that he had described his improvisations.

Ampoule Syringes.—In these, syringes, solution, and needle in sterile condition are ready assembled for instant use. Each can be carried in its carton in the pocket, or, for better protection, several may be placed in a tin box, and no preparation is necessary which cannot be carried out under any circumstances met with. They can also be used in the dark. There are two disadvantages: (*a*) a fractional dose to a child is difficult to regulate; (*b*) each injection costs about a shilling.

Protected Hypodermic Syringe.—Before going into action, a 2 c.cm. Record syringe fitted with a No. 17 needle, and loaded with four full doses of morphine, is housed in a sterile test tube in the manner described by me in the *Journal* of March 2 (p. 365), care being taken to reduce to a minimum the collar of wool and lint which secures it in position. The bottom of the tube is now fitted into the base of the wooden stand of an Esbach's albuminometer, being secured there by strapping if the fit is not tight enough, the long cover being then applied. Care must be taken that there is sufficient clearance between the head of the plunger and the top of the cover, the test tube being shortened if necessary. The holder is about eight inches long, and can be stowed head downwards in the breast pocket, but spilling should not occur in any position with the small needle used. In this method, which works well in the field, four successive full doses can

be given under any difficult circumstances without reloading, and fractional doses to children are also possible. The problem of changing needles, sterilizing the skin, and so forth must depend on circumstances, but some sepsis will probably have to be risked. At the same time, small case bottles containing spirit, morphine solution, and a supply of needles in spirit should be carried into action.

Morphine by Mouth.—A hypodermic tablet may be placed under the tongue or a draught employed. In severe road accidents and Service conditions I have not been favourably impressed with the efficacy of this method, which cannot compare with the hypodermic route, and a medical officer at the first-aid post or hospital might hesitate to give an injection if a full oral dose had been given, say, half an hour previously.

Accessories.—The head inspection lamp, No. 3592, as supplied by the Ever-Ready Company, is of the utmost value in road accidents at night, and, suitably hooded, dimmed, and diaphragmed, could, I think, be safely used in night raid work. The lamp is carried on the forehead by an elastic band and is shielded above by the brim of the steel helmet. The battery is housed in a metal cylinder, which carries the switch and can be clipped over the breast-pocket flap. This leaves both hands free for work, and eliminates the necessity of an extra worker, who tries to focus the beam of a pocket torch on the graduations of the syringe.—I am, etc.,

Rustington, Sussex, Nov. 16. W. E. WALLER.

Problems of Transfusion

SIR,—With reference to Mr. J. T. Rice Edwards's question under the above heading (October 19, p. 535) I should like to refer to the fact that damage may occasionally be produced if the blood of so-called universal donors belonging to the group O is used for transfusion. It is true that the risk of accident is usually much greater if the patient's serum contains antibodies against the erythrocytes of the donor, but the risk still remains to some extent when the donor's serum contains iso-antibodies against the recipient's erythrocytes. This is especially so when the donor's blood has a high titre of antibodies or if the patient suffers from severe anaemia. In such cases the possibility of an accident would, of course, increase with the amount of blood transfused; but it is difficult to determine a limit to the amount of blood which can be transfused with safety, since conditions may be different in every case. According to statements to which references are given by Wiener (*Blood Groups and Blood Transfusion*, London, 1939, 2nd ed., p. 92) the possibility of haemolysis arises when more than 200 c.cm. of blood is transfused.

However, I rather doubt whether it is ever justifiable under normal conditions to give Group O blood to a Group A patient. The use of universal donors should be an emergency measure only when circumstances do not permit the use of the blood of the same group for transfusion. Such a lack of blood of corresponding group usually only concerns patients belonging to Groups B and AB, for in Great Britain Group A is nearly as common as Group O. It must be realized that the possibility of agglutination and haemolysis of the patient's erythrocytes is greatest if the patient belongs to Group A, for the A antibodies are on the average stronger than the B antibodies. Patients belonging to Group B are therefore usually less endangered if O blood is used for transfusion. Antibody action may also be reduced when the patient belongs to the group AB, because both antigens are usually less strongly marked in this group than in the groups A and B.

It must be emphasized that when plasma or serum is used for transfusion instead of whole blood there is no reason to attribute the character of universal donors to people belonging to Group O. On using plasma or serum for transfusion, damage, if any, can be caused only by the donor's antibodies. The serum or plasma of AB individuals is therefore most suitable. Because of the rarity of the AB group, however, it is unfortunately impossible to fulfil this ideal in practice. Moreover, the use of plasma from which iso-antibodies have been removed by mixing A and B blood, as recommended by Mr. F. Ronald Edwards, Mr. J. Kay, and Prof. T. B. Davie (March 9, p. 377), is a measure limited by the rarity of Group B. If, therefore, plasma or serum of the same group is not available, and if AB or antibody-free serum cannot be obtained, it would be advisable to use A plasma or serum for transfusion. It is preferable to O plasma or serum because it contains only B antibodies, which, moreover, are often less active than the A antibodies.—I am, etc.,

School of Pathology, Trinity College, Dublin, Nov. 4. H. SACHS.

Arrested Tuberculosis and Military Service

SIR,—Dr. John Aspin in his letter (November 2, p. 608) in reply to mine says: "When a case of pulmonary tuberculosis is classified as 'arrested,' is it not usual to make the reservation, consciously or subconsciously, that the man's condition will continue to be arrested so long as he can avoid excessive overwork or severe privation?" I fear the idea is only too prevalent that pulmonary tuberculosis is hardly ever "completely arrested" (or, if you prefer it, "healed" or "cured"). Tuberculosis is a bacterial infection, and if all the bacilli have died out, how can there be any "reactivation of old lesions" except by a fresh infection? I suppose that Dr. Aspin would not deny that it is possible for the bacilli to be all killed off in cases where the disease becomes arrested; he would probably not go beyond saying that such cases were exceptional. Yet surely all the evidence points to the fact that thousands of people recover from pulmonary tuberculosis, many before the disease has advanced beyond the early stage; others—certainly far less numerous, yet not to be ignored—after the disease has passed beyond the early stage. If a patient has been under observation for five years or more, and during the whole of that time has been entirely free from symptoms and active physical signs, has felt well, and been able to follow his usual occupation, and gives no *x*-ray evidence of active disease, is it not far better to lift from him the ban of tuberculosis, and risk the occasional occurrence of a "reactivation" where the disease has not been really cured?

Dr. Aspin concludes his letter by saying, with regard to all men who come before the medical boards with any past history of pulmonary tuberculosis, that in his view "the simplest and the most satisfactory way of dealing with these men would be to certify them all as unfit for military service." A rough-and-ready method. The "simplest," yes, indeed! "The most satisfactory," in my humble opinion, no. Moreover, it should be remembered that men can be graded, and that even if a man is not considered fit for military service in the front line over-seas he might be considered fit for home service. He would not then be necessarily subjected to the "excessive work or severe privation" with which Dr. Aspin safeguards his reservation.—I am, etc.,

Southborough, Tunbridge Wells, Oct. 20. E. WEATHERHEAD.

Tuberculosis in Young Women

SIR,—So many factors have been suggested to explain the remarkable retardation in the decline in mortality from tuberculosis among young women in this country in the present century that it is almost a relief to epidemiologists interested in the phenomenon to be able to dismiss one of them from further consideration. Wolff's so-called "natural explanation," which has been discussed in one of your recent annotations (October 26, p. 564), that the retardation in England and Wales was largely caused by the transitory rise in the birth rate about 1920 is so at variance with the known facts that for a number of reasons it is quite unacceptable as an explanation of the phenomenon. These reasons may be summarized as follows:

1. The transitory rise in the birth rate incriminated by Wolff took place in 1920, whereas the great peak in the respiratory tuberculosis mortality among young women took place in 1918—two years earlier.

2. The check to the previously steadily falling respiratory tuberculosis mortality of young women occurred about 1900, at a time when the birth rate was falling with progressively increasing speed.

3. The retardation has been much the most marked in the age group 15 to 24 years, an age group in which only about one-sixth of the young women in England and Wales are married. Of this one-sixth the large majority are over 21, and would, therefore, if their respiratory tuberculosis mortality were adversely affected by childbearing, swell the mortality

figure for the age group 25 to 34 years rather than that of the earlier age group.

4. From the recent issue of the Registrar-General's Decennial Supplement for 1931 it is possible to ascertain comparative figures for the mortalities from certain diseases of married and single women in various social classes. Apart from a few exceptions, which are mostly in those social classes that contain only a small number of married women, the mortalities from respiratory tuberculosis among single women are definitely higher than those found among the corresponding married women of this age group.

There are thus no grounds for believing that the 1920 rise in the birth rate in this country has played any part in the retardation in the decline in respiratory tuberculosis mortality of young women in the age group 15 to 24 years. The search for methods of overcoming the ravages of this disease may therefore continue along other and more hopeful lines than that of discouraging young women from exercising their natural maternal functions.—I am, etc.,

Farnborough, Kent, Nov. 6. G. PAYLING WRIGHT.

Obstructive Oedema of Lower Limbs

SIR,—I was interested to read the report by Drs. B. Hirsh and R. Ellis (November 2, p. 593) of two cases of bilateral oedema of legs following fixation of the chest whereby interference with deep inspiration had resulted in embarrassment of venous return. I have seen a similar condition in the newborn infant in whom a too tightly applied binder interfered with the normal abdominal respiration and was the only apparent cause of a symmetrical oedema of the lower limbs. Loosening of the binder led to a quick disappearance of the oedema.—I am, etc.,

Birmingham, Nov. 5. FRANCES BRAID.

Effect of Urethral Obstruction on Kidney

SIR,—The accepted rule that obstruction of the urethra, if slowly induced, produces back pressure which travels up the ureters is not, I think, quite correct, because dilatation of the bladder tends to close the orifice of the ureters and so a flow only in the downward direction is possible. If the pressure in the bladder is great enough urine may be retained in the ureters and so produce the pressure symptoms, but this again is subject to conjecture. It is conceivable when the pressure inside the ureter gets as great as, or greater than, that of the bladder the lower end may become dilated and so produce the pressure effect. In my opinion lack of tone of the muscle is produced more by secondary infection aided by the disorganized circulation caused by the pressure, and, of course, the general lack of tone from the degeneration of the general health.

I have not for some time been able to do any experiments on normal animal bladders obtained from the butcher. One finds that dilatation of these dead organs does not require the sealing of the ureters to produce a considerable increase in size of the bladder to the normal organ before any noticeable increase in pressure is registered in the ureter. I consider, therefore, that the back pressure on the kidneys is not produced by the obstruction directly, but more by the muscular effort of the ureter itself to overcome the closure of its orifice, followed at a later stage by the lack of muscular tone noticed in these cases in the late stages.—I am, etc.,

Torpoint, Cornwall, Nov. 4. GEO. S. ASTON.

National Dried Milk

SIR,—I was interested in Dr. A. G. Watkins's letter on national dried milk (November 2, p. 612). Surely it is possible to modify such a milk in the same way as one can modify cow's milk; it must be remembered that milk-and-water mixtures are still used successfully in some parts of the country. The prepared humanized milks are useful, but it seems a pity that doctors in charge of clinics do not rely more often on their knowledge of infant feeding rather than on the "directions on the packet." These directions have the following disadvantages:

1. The amount of food to be given to the infant at each feed is based on age, no allowance being made for variations in size and weight.

2. It is suggested that the child should first be fed on a "humanized" or No. 1 food; these foods are supposed to approximate roughly to breast milk. At 3 to 4 months of age, for no physiological reason whatever, a change to a full-cream or No. 2 milk is advised, and these foods are to be made up in such a way that whole cow's milk is approximated—that is to say, the percentage of protein changes from 1.5 to 4, and that of carbohydrate from 7 to 4. The fact that some children thrive on this curious system is not to my mind sufficient excuse for its continuance. It would seem that we allow the patent-food manufacturers to direct our infant feeding instead of devising our own formulas.

National dried milk can be used for quite small babies, but the feeds should be made up like milk-and-water mixtures. If the rule of 2½ oz. per pound body weight for amount of fluid to be given in twenty-four hours be followed, the quantity for any one feed can be quickly arrived at by dividing the weight of the infant in pounds by two; this gives the number of ounces for one feed. If 1½ or 2 is then subtracted from this figure the number of measures of dried food required is obtained. Sugar must be added—1 to 1½ teaspoonfuls up to about 3 months, and 1½ to 2 teaspoonfuls from 3 to 6 months. Thus a suitable feed for a 10-lb. baby would be: national dried milk, 3½ measures; water, 5 oz.; sugar, 1½ teaspoonfuls: five feeds, four-hourly. This feed satisfies caloric requirements.

Used in this way the national dried milk gives good results. Moreover, it is possible to vary the amounts of protein and sugar according to the baby's individual needs if it is remembered that protein is constipating and that sugar has the reverse effect. Thus digestive disturbances can be treated by simple adjustment of the food rather than by recourse to drugs such as the grey powder. With regard to the vitamins the amount added to the dried milks is not sufficient to protect the infant from rickets, and cod-liver oil or a concentrate should always be added in adequate doses.

The only disadvantage seems to me to be the lack of iron; this, however, can easily be remedied by giving 9 grains of iron and ammonium citrate daily. Personally I enjoy using the food and am getting excellent results in my clinics; moreover, its continued use may even revive the gentle art of infant feeding.—I am, etc.,

Erith, Nov. 10. CÉCILE ASHER.

Government Cheap Milk Scheme

SIR,—Members of the medical profession have warmly welcomed the July, 1940, Milk Scheme because it represents a very real advance in our social legislation, the more noteworthy since it has happened in time of war. Perhaps the main implication of the scheme is that the Government now accepts a special responsibility for the nutritional care of the mothers and young children as such. There is wisdom in this appreciation of their value to the nation and the special care they require. The Children's Nutrition Council has always pressed for such a policy and views it with satisfaction. This satisfaction must, however, be tempered by an appreciation of certain facts.

First, coincident with the presentation of the scheme there was a rise in the price of milk in Scotland from 3d. to 3½d. per pint, and this rise was later followed by a further to 4d. per pint. Secondly, since some 8% of the population are eligible for the scheme it follows that 92% are paying considerably more for this milk than previously. Past experience has shown that such increase in price means decrease in consumption. It is hoped, however, that the considerable increase of milk consumption under the scheme will balance the expected fall in the ordinary priced milk. This larger category includes, of course, most of our invalids and convalescents, our old age pensioners, and our adolescent children, categories which we feel should be included in any future development of the scheme.

While noting these facts, the immediate aim of this letter is to urge a greater appreciation and use of the scheme as it stands. We appeal to practitioners, and especially to Scottish doctors, to use their wide contact with mothers and young children to achieve as near as possible a 100% use of the milk scheme. It is of interest to notice and compare the acceptance of the scheme in different parts of Great Britain

at September 11. In England 67% of possible users are in the scheme; in London 86%; in Scotland 42%; in S.E. Scotland 54% (more recently 70%); in Edinburgh 60% (more recently 70%); in Glasgow 44% (more recently 55%).

In view of the importance of milk consumption as a public health measure we in Scotland cannot be gratified at our slowness in achieving a fuller use of the scheme. Do the figures mean that the co-ordination of our public health services is less advanced than is that in England? The fact that our infantile mortality rate stands at a figure lamentably higher than that for England may well be linked up with such factors. Our Council therefore appeals to the doctors in Scotland to co-operate to the fullest extent with the Government milk officers in popularizing the milk scheme. To this end we advise contact, either individually or through local divisions of the B.M.A., with the milk officers, who will gladly supply medical men with copies of the application form. The administrators of the scheme are anxious to stress the fact that, while the free milk is for people of certain income levels, the cheap milk at 2d. a pint is meant for the use of all expectant mothers and children under 5 irrespective of income, and that it is something in the nature of a citizen duty to use and encourage its fullest possible use.

On behalf of the Children's Nutrition Council (Edinburgh Branch)—We are, etc.,

ERIC F. DOTT, *Chairman.*
J. LIPETZ, *Secretary.*

Benzyl Benzoate Treatment of Scabies

SIR,—In reference to Surgeon Lieut. R. Ernest King's article on the benzyl benzoate treatment of scabies (November 9, p. 626), I have been carrying out this treatment in Dr. Hugh Gordon's skin department at West London Hospital for more than three years, and we now rarely use the older methods as benzyl benzoate has proved so effective. We have found, however, that out-patients usually require two applications on two successive days. Children under 6 or 8 years of age are likely to develop an erythema with the treatment, and for such cases we continue to use β-naphthol ointment.

While the benzyl benzoate causes no irritation in adults we have found that the original irritation tends to persist for some days. The use of calamine lotion containing ichthyol 2%, or a simple ichthyol cream, is therefore prescribed for two days as part of the out-patient treatment. A twenty-four-hour treatment is often effective in the case of in-patients, but even then certain resistant cases have required a second application.—I am, etc.,

London, W.1, Nov. 9. CLARA M. WARREN.

Diphtheria Immunization

SIR,—The letter by Dr. E. Brauer (November 16, p. 683) will, I fancy, catch the eye of some of those gentry whose mission it is to protect the honest British public against the evil machinations of our profession. Something on these lines: "It has recently been demonstrated that the so-called immunization against diphtheria, far from protecting against this dread disease, actually favours its spread among our children."

We will assume that the patient had not been artificially immunized. There is no mention of any Schick test on any of the children, nor of a virulence test on any of the strains isolated. The alleged immunity of the boy of 13 is supported apparently only by one "negative" swab; and it is tacitly assumed, against a mass of evidence to the contrary, that an attack of diphtheria naturally confers prolonged immunity, whereas it is commonly an indication of a pronounced and sometimes obstinate susceptibility to the disease. Moreover, any immunity gained from an attack is mainly antitoxic and not anti-bacterial, and therefore would not protect the respiratory passages from a temporary invasion by the bacillus. The Klebs-Löffler bacillus often persists for weeks or months in a recovered patient.

An equally justifiable if less sensational interpretation of the episode would be that a case of mild nasal diphtheria resulted in the temporary (or permanent) establishment of diphtheria bacilli in two of the contacts. The third contact may or may not have been involved. Properly presented, the facts, such as they are, might even bring a hesitating parent down on the right side of the fence: "Think what might have happened if those other children had *not* been protected!"—I am, etc.,

Sussex, Nov. 16. H. LYNDHURST DUKE.

Large-scale X-ray Examinations

SIR,—One hesitates to endorse the views of a clinician of such experience as Dr. Ernest Ward; nevertheless I think there can be few tuberculosis officers who would disagree with his observations. Cases of pulmonary tuberculosis in which clinical signs appear before the *x*-ray changes in the lung are quite exceptional, and I feel this cannot be emphasized too strongly in the interests of the public.

There are probably many general practitioners who hesitate to refer a case of suspected pulmonary tuberculosis to the tuberculosis officer in the absence of any physical signs, and Dr. James F. Brailsford's communication (October 5, p. 471) did nothing to dispel such mistaken diffidence. Surely if a person has a lesion in the lungs which causes an abnormal *x*-ray picture it is better that it should be known. If such a case be referred to the tuberculosis officer and investigated before a diagnosis is made there will be little risk of the patients being prematurely labelled as "tuberculous." When the *x*-ray film shows some obscure shadow the tuberculosis officer will keep a patient under observation for months before making a definite diagnosis, and so long as the patient is fit to work he is commonly encouraged to do so.—I am, etc.,

Tuberculosis Hospital, Cymla, Neath, Nov. 11. E. ASLETT.

Restrictions on Physiotherapy Apparatus

SIR,—Dr. J. E. Bannen (October 26, p. 572) writes regarding the restriction on the use of physiotherapy apparatus.

While in agreement with him that these restrictions appear to have been somewhat arbitrarily applied, there is one sentence in his letter to which I must take exception: "The Press comments on radio treatment now savour very much of the old ultra-violet lamp, which would bring sunshine and health to all and sundry, the panacea for all ailments." I suspect from this remark that Dr. Bannen is casting aspersions on the value of the ultra-violet lamp. I feel I must cross swords with him on this subject. From experience with a modern ultra-violet lamp in the Naval unit to which I am attached, it has been discovered that the rate of sickness has been lowered by approximately 30%, and that the duration of incapacity has been similarly decreased. These findings will shortly be published in the form of a paper, but it appears unfortunate that at this time, when all possible means of maintaining efficiency are needed, one of Dr. Bannen's standing should belittle what is really an extremely useful addition to our armament.—I am, etc.,

PHILIP H. DALGLEISH,
Oct. 28. Surgeon Lieutenant, R.N.V.R.

Immunization against Influenza Virus A

SIR,—Your leading article on the subject of influenza (November 9, p. 632) is of great interest to practitioners, who, of course, meet this clinical entity in the raw and not on the agar plate. I feel that the vital question of natural humoral immunity to influenza is not stressed sufficiently. The virus A, B, C . . . *n* is of great scientific interest, but does not explain the fact that in any epidemic the individuals of a community, though equally subjected to the attack of the virus, do not all suffer from influenza. This fact is surely due not to the *qualitative* identification of the virus in those affected but to the *quantitative* amount of the virus toxin in the blood of all the individuals. When virus toxin accumulates above a certain threshold in the blood, influenza becomes manifest clinically; if the toxin is kept below this threshold the individual escapes clinical influenza. There is thus a struggle between toxin production and toxin elimination, and the result of this struggle determines whether the individual gets influenza or not.

Now the materials for influenza resistance cannot ordinarily come from any other source than diet, vitamins, balanced

endocrines, energy conservation, optimum environment, etc., in that one hundred free individuals cannot be comprehensively compared to one hundred captive mice. Vaccines can assist the detoxication of virus toxin, but this is a purely superficial therapy. For real immunity there must be built up by consistently rational living a sound humoral organic resistance, so far as politics, vested interests, food control, etc., choose to allow rational living to become possible. No consideration of influenza (or of any other disease) is comprehensive save on a humoral basis.—I am, etc.,

Kearsley, Lancs, Nov. 9. D. OCKMAN.

Our Unused Influence

SIR,—Up till a few years ago it was customary when anything went seriously wrong with the social life of the country to ask: "Why does the Church not do something about it?" To-day, with a change in fashion, we are being asked: "Why does the medical profession not organize to rid the world of war and all its horrors?" The second question at any rate shows lack of understanding in the minds of those who ask it. The simple, and I believe the true, answer is that the medical profession has something else to do. This does *not* mean that doctors have the right to cut themselves off from social and political responsibilities in order to save all their energies for the making of as good an income as possible out of their work, or even for exclusive devotion to their patients with little thought of monetary gain. The medical profession is organized for one specific purpose—namely, the promotion of health and the cure of disease—and should remain so organized.

Nevertheless the doctor, in common with his fellows, has a duty to the body politic, which is not discharged in the doing of his daily job, and instead of trying to organize the profession for political purposes he should play his full part at the side of every self-respecting member of the community in making the parliamentary machinery which already exists produce those results which all of us, in varying degree, desire. In my opinion it is here that doctors have failed. (It is strange that so many Englishmen, above all people, should treat representative government with a casualness bordering on contempt.) It is here that any education, culture, power, or influence which they possess could be used with such good effect.

Unfortunately, in the main not only have we failed to show a good example in political service, but we have not taken the trouble even to find out how democratic machinery should function. In saying this I do not wish to suggest that the doctor should become immersed in party politics—far from it; but it is essential that he get a right understanding of the parliamentary representative system, and that he be able to explain to others how it may be made to give satisfactory results. He must realize that his member of Parliament, regardless of party, is his representative. This is fundamental. The representative exists to bring to light the desires of his constituents. The keen constituent will give him all the help he can in this work. For instance, the doctor, acting politically and regarding people and things from a medical point of view, will keep him informed as to what are the expressed and unexpressed demands of people with whom he makes close contact from day to day. Others will deal with other aspects of the life of the division. Having used all the sources of information open to him, it is then the duty of the representative to find the greatest common measure of the demands of his constituency at that particular time, and to present it to the executive in the form of instructions for necessary action.

This, then, is the only effective method of influencing policy in our favour, of bringing government under the control of the will of the people. It may seem to have little to do with the abolition of war, but in reality the connexion is intimate. In following this line a beginning is being made in the removal of internal stresses and strains and conflicts which, if unrelieved, ultimately show themselves at the frontiers and lead to war. (I cannot believe that war is simply due to the universal depravity of mankind or to that man Hitler!) War is a by-product, a symptom which can only be treated effectively by treating the cause. There are no short cuts, no magic methods. We must begin at the point which I have indicated.

It is sad to behold the trail of wrecked hopes and disappointments which have been built on such foundations as: (1) asking the Prime Minister to do this or that; (2) united protests against war in general and this country's treatment of, for example, Italy and Japan; (3) writing to the League of Nations about it; (4) bringing pressure to bear upon certain fellow scientists to restrain them from making a living by making the bombs and mines which we now find so necessary; (5) concentrating on the bigger issues and believing that to enlarge a problem is the first step towards its solution; (6) blaming the weakness of human nature for the diabolical efficiency with which wrong objectives are being pursued; and, finally, the contemplation of the only hope of the world's salvation in the shape of the socialist objective of a peace which ensures freedom and justice for all races, white, yellow, and black, and not "riches" for one class or race only. Ah me! But hope springs eternal in the human breast, even though it be that of a doctor.—I am, etc.,

Bexley, Kent, Nov. 13. E. U. MACWILLIAM.

SIR,—The letters of Drs. George H. Alabaster (October 12, p. 507) and E. Cronin (October 19, p. 537), and the correspondence initiated by them, refreshingly indicate that there are members of the medical profession who are sensible of a high vocational responsibility.

I do not know what effect the impact of the last war had on the profession as a whole, but war such as the present one should imbue its members, more than any other, with a sense of complete fatuity. In this country our influence is negligible in the wider sphere of international politics, and on the internal administration not much greater. Is it very different in any other so-called sovereign State?

In the "years between," when intermittent pronouncements were made by statesmen of various colours on the salutary effects of war, no mention was made of famine and pestilence, a much graver menace than the bomber, if only because these two visitations acquire full force when hostilities have long since ceased. This, with other reasons enumerated by your correspondents, establishes the warranty of the medical profession in matters of war and peace. When we have ceased to consider our work as "disease through the microscope," as Dr. Alabaster so aptly puts it, when we have acquired the influence which I think is obligatory on our part in the internal administration, central and local, then deep shelters with proper sanitation, etc., would be available, doctors would not have to wait three days before their patients are discovered in cellars (*vide* letter by Dr. W. A. M. Swan, October 12, p. 506), and the interminable blundering of the administration which has exasperated many of us for so long may become bearable, and even give us some hope of the foreign chancellories of the world seeking and heeding medical advice.

I commend this subject to the members of the B.M.A. Medical Planning Commission as a framework of approach to their many problems, and well may they deal with it.—I am, etc.,

St. Albans, Nov. 6. D. S. MORGAN JONES.

SIR,—In blaming our profession for not taking a greater share in public life Dr. R. W. L. Ward (November 9, p. 648) is too kind to our accomplishments and unjust to our generosity. The medical is the most generous of all professions: certainly it is the hardest worked and the worst paid, and certainly no other profession carries out such a large proportion of its work without payment. But when Dr. Ward says the profession is "reasonably well educated, possibly fairly cultured," he surely claims too much.

Consider the training of the medical man qualified in the last fifteen years. At school he began to specialize in "science" at the age of 14 or 15; at 18 he went up to his medical school to undergo six years of strenuous technical training. He may take a degree in arts; if he does, he studies subjects that are included in both the arts and the medical faculties. At the age of 24 or 25 he acquires a qualification and begins a period of a year or two's residence in hospital. After this period four out of five men go into general practice, and for the next twenty years they will work anything over seventy hours a week at their practice. By the time he reaches 50 the medical man has become tired, disillusioned, and content with daily routine. Outside his technical knowledge his general knowledge is less than that of the average schoolboy of 15 who is

not being prepared for medicine. The one man in five who goes on to higher qualifications and more specialized work is in a worse position: before him is another three or four years' period of increased technical training. Ultimately he demonstrates the truth of the old definition: "The general practitioner knows less and less about more and more; the specialist knows more and more about less and less." As an example may I point out that the best textbook on clinical medicine that has been published in the last ten years solemnly invited its readers on at least four separate occasions to consider the "anthropoid facies" of a case of acromegaly. This textbook was enthusiastically reviewed—and deservedly—by all the journals, not one of which pointed out this glaring error from a leading member of a "reasonably well educated profession."

As a democrat one must believe that the opinion of the average exponent of one trade or profession is as good as that of another's; as a reasonable being one must admit that the plumber, the lawyer, the bricklayer, and the architect are probably able to form an opinion on wider general knowledge than the doctor and to express it in plainer language.—I am, etc.,

Bradford, Nov. 9. R. L. LANGLEY.

SIR,—Many doctors must be profoundly convinced of the terrible tragedy and folly of war, but probably feel how powerless they are to prevent it. We see the human side so clearly much more than politicians and people not so much in contact with real life. In our simplicity we believe that economics and ideologies are more than we can understand. What we have to assert to-day is that human welfare is of the first importance in our world, and other things must yield to its pre-eminence.

Supposing, for instance, we were to leave abstractions and ask the Council of the B.M.A. to lay down the conditions for a reasonable and lasting peace to-day. It might be theoretically possible, but should we be listened to for one moment? The first thing we should come up against would be that the Nazi ideology is founded on war, and war as a condition of classless society, as they are taught to believe. If we could counteract this with a theory of democracy which will prove workable and yet give the ordinary man greater freedom and happiness we should win millions to our side, but the very statement of these things shows how much knowledge and good will is required for this. Who is sufficient for these things?—I am, etc.,

Letchworth, Nov. 10. NORMAN MACFADYEN.

SIR,—In Dr. R. W. L. Ward's letter (November 9, p. 648) there are several statements which deserve serious consideration. It is pointed out that although "the medical profession is concerned with the saving of life it has made no concerted effort to preserve the peace of the world and thereby save a hundredfold more lives"; also that "plumbers, lawyers, bricklayers, and architects take far more interest in our national life than we do." Surely this latter statement is hardly correct; if it is, then one must assume that the doctor is so fully occupied with his daily work that he is unable to find time to interest himself in affairs of national importance. Although his working day is certainly not limited to eight hours it is difficult to believe that any man educated in the principles of biology and medicine is incapable through lack of time of forming an opinion on the political handling of events leading up to the outbreak of the present war. We know that the best way to prevent loss of life when threatened, for example, by malaria is to attack the anopheles in his own lair, and, in dealing with epidemics such as typhoid, not only to attack the source of the danger but also to raise physical resistance by the development of immunity. I must confess, however, that in spite of our education I have at times been struck by the views of odd medical men whose attitude appears to be, "Let immunity go hang; appease the bug."

Well, granted the great majority of medical men take a sensible view of these matters, founded as they are on the facts of life, how can we exercise such powers as we undoubtedly should have to bring pressure to bear on the proper quarters? As a profession we should have weight, but of late there has been a tendency towards creating a State medical service, which, if established, would of course prevent any concerted action by its members; our profession would become a branch of the civil service with a lay civil servant at the head—trained in administration, as it is termed—and so the profession would be kept in its proper place. Concerted action could readily be initiated by bringing the matter forward through our present organization, but a very potent method would undoubtedly be the individual influence of the doctor in the course of ordinary conversation, and it would be well to remember that man is a predatory animal, however much the "haves" desire the "have nots" to forget it.—I am, etc.,

St. Mawes, Cornwall, Nov. 11. B. H. SHAW.

*** This correspondence is now closed.—ED., *B.M.J.*

Obituary

C. W. MANSELL-MOULLIN, C.B.E., M.D., F.R.C.S.

We regret to record the death on November 10, at the age of 89, of Mr. C. W. Mansell-Moullin, consulting surgeon to the London Hospital.

Charles William Mansell-Moullin was born in 1851 and was educated at Pembroke College, Oxford, where he was a Fellow, and St. Bartholomew's Hospital. He also studied at Vienna, Paris, and Strasbourg. Mr. Moullin took the F.R.C.S. in 1878 and the M.D. in 1879. He held a Radcliffe travelling scholarship, was Hunterian Professor of Surgery and Pathology, Examiner in Surgery in the Universities of Oxford, Cambridge, and Glasgow, and was a Member of the Council and Vice-President of the Royal College of Surgeons of England. He published works on enlargement of the prostate and its treatment, the treatment of malignant disease, the surgical treatment of gastric ulcer, and the biology of tumours. We are indebted to Mr. H. S. Souttar for the following appreciation:

Mansell-Moullin went to Oxford in 1869, the year in which Helmholtz was a candidate for the professorship of physics. He took a brilliant degree, became a Fellow of Pembroke, and obtained the Radcliffe Travelling Fellowship, which enabled him to travel to Vienna, Strasbourg, and Paris. He entered St. Bartholomew's Hospital and took his Oxford degree from there, but he was soon afterwards elected an assistant surgeon at the London Hospital in 1882, and with it he remained connected for the whole of his medical career. He took an active interest in the progress of surgery and was a Member of the Council and Vice-President of the Royal College of Surgeons. He was for some time President of the Röntgen Society in its very early days. He was a fine teacher and an exceptionally clear lecturer, and his punctuality became proverbial; he entered the door of the lecture theatre as the clock struck, and he began to speak as he approached the table. With his last words he passed out through the door, again as the clock struck, but he had never looked at a note or at the time. Every Sunday morning he walked from the Bank to the London Hospital and went round the whole of his patients with his house-surgeon, who always regarded this as the greatest privilege of his appointment. His knowledge of surgery and his surgical judgment were both of the very highest level, and he was one of the first surgeons in London who developed the then new technique of abdominal surgery. Many of his aphorisms have become proverbial—"When you open the abdomen you may think that you know what you are going to find, but you never really do."

A somewhat shy man, he was the very soul of kindness, and none of his students, and still more his residents, will ever forget his generous hospitality. He retained his interest and his energy to the very end, for at the age of 80 he learned Russian and actually visited Russia in order to study conditions in that country, while only a few weeks before his death he sent me a copy of a paper on cancer and asked for criticisms.

We regret to record the death at Woking on November 7 after a very short illness of Dr. OLIVER TREADWELL, who had spent all his active years in the prison medical service.

Dr. Treadwell, who was 80 years of age, was educated privately and at St. Thomas's Hospital, qualifying M.R.C.S. in 1881 and L.S.M. in 1882. In the latter year he was appointed assistant surgeon at Millbank Prison, and he served in this capacity at other prisons until he went to Durham Prison as medical officer in 1885. He remained at Durham until he was transferred in 1894 to Borstal Prison, then a convict establishment; later he became medical officer of Portland and also Parkhurst Prisons. In 1914 he was promoted to the office of Inspector of Prisons, and in 1917 became one of H.M. Commissioners of Prisons and a Director of Convict Prisons. He retired because of ill-health in 1921. Although Treadwell was by nature diffident and retiring, he was a loyal and upright friend and an unselfish colleague; an abiding sympathy for those in distress endeared him to all who knew him. At the last inquest held at Durham Prison before Treadwell was transferred the coroner observed that it must be gratifying to relatives to know that prisoners received such kindness as he had bestowed upon them. His skill and care are still remembered by the few remaining prisoners who formerly came under his supervision. He was a keen sportsman, excelling at tennis and golf. He had two sons and a daughter; the elder son died with his regiment in India in 1906, while the younger died from wounds received during an aerial fight in the war of 1914–18. His son-in-law also was killed in action in 1916, and those who knew him well realize that these losses saddened his remaining years. A wide circle of friends will mourn his loss and extend their heartfelt sympathy to his widow and daughter.

The following well-known medical men have died abroad: Dr. MAX CLOETTA, professor of pharmacology and director of the pharmacological institute at Zurich, aged 71; and Dr. C. H. DIXHART, principal medical officer of the Rhodesia Railways since 1921.

Universities and Colleges

ROYAL COLLEGE OF SURGEONS OF ENGLAND

At a meeting of the Council of the Royal College of Surgeons of England held on November 14, with the President, Mr. Hugh Lett, in the chair, Mr. Robert Milne was re-elected, and Mr. V. Zachary Cope, Mr. C. E. Shattock, Mr. M. F. Nicholls, and Mr. E. W. Riches were elected as members of the Court of Examiners for a period of one year from December 12.

Diplomas

Diplomas of Membership and of Public Health were granted to those candidates whose names were published in the report of the meeting of the Royal College of Physicians of London in the *Journal* of November 9 (p. 653), and in addition a diploma of membership was granted to John Chichester Day of St. Mary's.

ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH

At a quarterly meeting of the Royal College of Physicians of Edinburgh, held on November 5, with the President, Dr. Alexander Goodall, in the chair, Dr. Thomas Anderson (Glasgow) was introduced and took his seat as a Fellow of the College.

Dr. J. C. R. Buchanan (E.A.A.M.C.), Dr. John Harold Ewen (London), and Dr. James Colin Caird (Edinburgh) were elected Fellows of the College.

The Hill Pattison-Struthers Bursary in Anatomy and Physiology was awarded to Robert Power Cookson, and the Hill Pattison-Struthers Bursary in Clinical Medicine to Allan Ralph Bleich. The Wood Bursary was awarded to Eric Alexander Masterton Wood.

ROYAL COLLEGE OF OBSTETRICIANS AND GYNAECOLOGISTS

The following candidates have satisfied the examiners for the Diploma of the College:

H. I. C. Balfour (West Worthing), H. V. Corbett (Liverpool), H. Doberman (Middlesbrough), Ruth Edmonds (Leeds), J. B. Farquhar (Birmingham), M. Ll. Gaudin (Canada), C. Grimshaw (Perth), Doreen M. Martin (Preston), Mary C. J. McCann (London), A. F. Pearson (Salford), H. P. Swan (London), R. H. White-Jones (Liverpool).

The Services

CASUALTIES IN THE MEDICAL SERVICES

ROYAL ARMY MEDICAL CORPS

Prisoners of War

Major William Lindsay Kinnear, R.A.M.C.
Acting Major Edward Davies-Thomas, R.A.M.C.
Acting Major Claude Hepburn Imrie, R.A.M.C.
Captain John Russel Heslop, R.A.M.C.
Lieut. Ferdinand Duval, R.A.M.C.
Lieut. Austin George Hewer, R.A.M.C.
Lieut. Norman Everard Monteuuis, R.A.M.C.
Lieut. William Sillar, R.A.M.C.

Medico-Legal

CASES OF INFANTICIDE: A NEW POINT IN LAW

A new and interesting point was raised at Norwich Assizes on October 23 by Mr. Linton Thorp, K.C., in defending a woman charged with infanticide. At the end of the case for the prosecution Mr. Thorp submitted that there was no case to go to the jury. He said that the Act of Parliament on which the indictment was based, which was passed in 1922 and was unaffected in this respect by the later Act of 1938, made the offence a statutory one, not a common law offence, and it followed in his submission that the prosecution must prove all the ingredients—not merely some of them—in the relevant section of the Act. These were: that the accused caused the death of her newly born child; that she did so by a wilful act, meaning an act deliberate and intentional; that at the time the balance of her mind was disturbed; and, finally, that it was so disturbed by reason of her not having recovered from giving birth to the child. This placed the prosecution in the dilemma that if they proved that the balance of her mind was disturbed they necessarily failed to prove that it was a wilful act, and if they proved that it was a wilful act they could not prove that the balance of her mind was disturbed, for how could a person of disturbed mind commit a wilful act? He agreed that it was a startling submission, and that if accepted it would mean that every person so far convicted under the Infanticide Act had been wrongfully convicted, but he was concerned with the defence in this particular case. He cited some old judgments on the meaning of the word "wilful." In a vendor and purchaser case in the Chancery Division in 1886 Lord Justice Bowen interpreted "wilful" as denoting the act of a free agent, one who knew what he was doing and intending to do it. In the case of Regina *v.* Senior in the Queen's Bench in 1899 Lord Russell of Killowen again said that "wilful" meant "deliberate and intentional," something done not by accident or inadvertence, but carrying with it the mind of the person who did the act.

Mr. Justice Singleton said that Mr. Linton Thorp's argument, if it held good, might lead to the substitution of the indictment for one of murder, and result in a verdict of guilty but insane.

Mr. Thorp replied that in the present case the judge could not amend the indictment, and that murder was not an alternative charge.

To this the judge answered that he could direct that the trial proceed no further, and that an indictment for murder be presented, whereupon Mr. Thorp said that in that case he would fall back upon the argument that nobody could be placed in peril twice.

His lordship ruled that there was a case to go to the jury, and later in his summing-up he said that if the jury came to the conclusion that the accused caused the death of her child by a wilful act, and also that the balance of her mind was disturbed by reason of not having recovered from giving birth to the child, they would bring in a verdict of guilty of infanticide. Unless it was proved that the death of the child was brought about by her wilful act they were bound to acquit

her. As a general rule every person was taken to intend the consequences of his act. The jury must have regard to this particular case and this only. Mr. Thorp had submitted that the new offence created by the statute was so defined that it could never be proved, and in that case the Act of 1922 and that of 1938 were a nullity. But that was a point of law, and it was for the jury to consider the facts of the present case.

The jury found the accused guilty of infanticide, and she was bound over for twelve months. Mr. Thorp asked for a certificate giving leave to appeal on the point of law, but this the judge refused to grant, saying, however, that there was nothing to prevent the defence going to appeal without such certificate.

Medical Notes in Parliament

The 1939–40 session of Parliament was ended by prorogation on November 20, and the King opened a new session on November 21.

Central Medical War Committee

Mr. MALCOLM MACDONALD stated on November 12 that in addition to those whose names were submitted by the Central Emergency Committee of the British Medical Association, he or his predecessor at the Ministry of Health had appointed as members of the Central Medical War Committee Dr. J. Alison Glover, representing the Board of Education, and Sir Hubert Bond, representing the Board of Control. He would not now appoint members of the Medical Practitioners' Union. He was not aware that many local medical war committees considered themselves as appointed by and responsible to the British Medical Association. If supplied with the names of such committees he would consider asking the Central Medical War Committee to take the necessary action.

Mr. ERNEST BROWN said on the same date that he knew some local medical war committees in Scotland had appointed an executive committee with power to deal with urgent matters. Such an arrangement seemed essential for expedition, and he did not propose to interfere.

Mr. MACDONALD informed Mr. Groves on November 12 that the object of Regulation 58A of the Emergency Powers (Defence) General Regulations, as regards medical practitioners, had been attained hitherto by procedure under which the Central Medical War Committee advised a practitioner that it was proposed to recommend him for allocation to a post, and gave him an opportunity of accepting it voluntarily. If and when the occasion arose a formal direction would be given under the Regulation in proper cases. The assistant secretaries of the Ministry of Health and of the Department of Health for Scotland were concerned with administrative questions on the number of medical personnel required for the Emergency Medical Service, the method of obtaining them, their distribution, and the terms on which they were engaged, as well as with general co-ordination of the demands for medical personnel in wartime. At least so far as the great majority of doctors in civil practice were concerned there was not disquiet at the attitude of the Central Medical War Committee.

Milk

Major LLOYD GEORGE said on November 12 that certain local authorities, by advertisements in the public press and by the issue of handbills, warned those entitled to cheap or free milk under the national milk scheme that they would get the best and safest by the purchase of pasteurized or tuberculin-tested milk. Lord WOOLTON saw no objection to local authorities informing any section of the public of their opinion on the qualities of milk of various types. He had himself issued a general statement that maximum protection against the present special dangers of infection could be obtained by the boiling of milk which had not been pasteurized or sterilized.

Mr. TOM WILLIAMS said on November 12 that as satisfactory progress had been made in the production of quality milks in recent years and a substantial proportion of the total output was now of accredited or higher standard, it hardly seemed appropriate, under the difficulties of wartime production, to compel farmers to conform with higher standards of quality than were considered necessary in peacetime.

Compensation for Byssinosis

Moving the second reading of the Workmen's Compensation and Benefit Bill in the House of Lords on November 12, the DUKE OF DEVONSHIRE said byssinosis was a disabling condition of the lungs attributed to inhalation of fine particles of cotton dust, which penetrated deeply, producing chronic bronchitis, complicated by emphysema, and in some cases asthma, after not less than twenty years' employment in dusty processes of the cotton industry. The disease was prevalent among operatives in cotton rooms, in cotton blowing rooms, and in card rooms. The Bill applied only to male workers. The trouble was caused by the heavier processes in cotton-mills on which women were not employed. This disease was not scheduled under the Workmen's Compensation Act because in many cases the diagnosis was so difficult that the general medical practitioner, or even the factory examining surgeon, could not be certain that it was occupational in the case of a particular individual.

Lord Simon, when Home Secretary, had therefore set up a committee under Sir David Ross, which had reported that where there was total incapacity after not less than twenty years' employment in the industry a medical board should be able, after considering the industrial history as well as the medical evidence, to decide whether the respiratory disease was occupational in origin. They recommended for cases occurring in the future a scheme within the Workmen's Compensation Act on the lines of the schemes for silicosis and asbestosis, and a special scheme for men who, disabled by the disease, had already left the industry. The Bill enabled the Home Secretary to make a compensation scheme for future cases, and also gave statutory effect to a scheme for old cases agreed upon by employers and employed.

Lord ADDISON welcomed the Bill, and it was read a second time. The third reading followed without debate on November 13.

The Bill passed through all stages in the House of Commons on November 19 and obtained the Royal Assent next day.

Atebrin

On November 19 Sir ERNEST GRAHAM-LITTLE asked the Minister of Shipping to consider substituting in ships' medicine chests atebrin for quinine, as this was now manufactured in this country, and was regarded by competent malariologists as being superior to quinine both as a prophylactic and as a curative agent. Mr. CROSS said he proposed to issue to ships carrying doctors a memorandum prepared by the Minister of Health in which advice was given regarding the use of atebrin. That drug should be administered only under medical supervision, and should not be included in the ordinary ship's medical chest because it was not suitable for use by unqualified persons.

Children's Camps

On the report stage of a Supplementary Estimate for the Ministry of Health Mr. MALCOLM MACDONALD said that delay in constructing the camps under the Camps Act of 1939 had resulted from the war and from the weather of last winter, but the capital cost had increased and this Supplementary Estimate was required. With the war a decision had been taken that the camps should become residential schools, with sick bays, and other provisions for the care of children during winter. There were thirty-one camps in England and Wales, and all had been occupied since the middle of the summer. One was occupied by a school for crippled children. Some 6,000 boys and girls were at present in the camps, but that was not the full capacity. These children were healthier and better educated than before. When the war was over Parliament should provide for sending town children to spend a period of each year in the country.

Mr. EDE stated that in these camps the incidence of illness was far heavier among the "under elevens."

Medical News

Dr. Andrew Topping was appointed Deputy Medical Officer of Health and Deputy School Medical Officer to the London County Council on November 19.

Sir Beachcroft Towse, V.C., the blind owner of Long Meadow, Goring-on-Thames, has put his home at the disposal of the National Institute for the Blind for the training of those suffering from recent loss of sight, some of them as a result of air raids.

Mr. A. Dickson Wright will read a paper on "The Treatment of Wounds" before the Royal Society of Arts (John Adam Street, Adelphi, W.C.) on Wednesday, November 27, at 1.45 p.m.

Medical and veterinary research will form the subject of one of the fourteen sections of the Indian Science Congress Association which will be held at Benares from January 2 to 8, 1941. Further information can be obtained from the General Secretary, 92, Upper Circular Road, Calcutta.

All communications for the National Radium Commission should be addressed to the Secretary at East Cottage, Petty France, Badminton, Gloucestershire. The office secretary hopes to be in London at frequent intervals for interviews, etc., and particulars of time and place will be notified later.

Until further notice the House and Library of the Royal Society of Medicine (1, Wimpole Street, W.) will open at 9.30 a.m. and close one hour before the official black-out time.

The *Jewish Chronicle* states that in the course of the past year approximately 50,000 Jews have managed to escape from Vienna to other countries and about 5,000 have died, mainly through starvation and disease and ill treatment by the Nazis. The remaining 45,000, forced to live in congested houses under insanitary conditions, suffer from nervous diseases and insomnia, and the local Rothschild Jewish Hospital has to deal daily with huge numbers of cases. It is now reported that the new Nazi administrator of Vienna, Baldur von Schirach, is planning to confiscate the hospital.

Suggestions for the organization of physical training for girls and young women and for boys and young men are contained in two pamphlets just issued by the Central Council of Recreative Physical Training. Advice is given on such matters as indoor and outdoor accommodation and facilities, the choice of activities, the length of sessions, equipment, etc. Copies of the pamphlets may be obtained from the offices of the Central Council, 58, Victoria Street, London, S.W.1, price 3d., post free.

Works Safety in Wartime is the title of a pamphlet issued by the Ministry of Labour and National Service describing a scheme for preventing accidents in factories which has been devised by the National Safety First Association. The first part of the pamphlet outlines a service to industrial concerns of posters and educative literature. Parts 2 and 3 contain advice and information on the establishment of safety committees and similar organizations, and on first-aid instruction in factories and workshops.

The Ministry of Labour and National Service, in collaboration with the Royal College of Nursing, has arranged a short intensive course of instruction lasting about one month for trained nurses to fit them for nursing duties in factories. Candidates, who must not be under 25 years of age, will be selected by a board, and their fees for the course, part of which will be spent in practical training in factories, will be paid by the Ministry together with certain allowances. Full particulars and forms of application may be obtained from the Ministry of Labour and National Service, Factory and Welfare Department, Cleland House, Page Street, London, S.W.1.

Dr. Frank Howard Lahey, a well-known Boston surgeon, has been elected president of the American Medical Association.

According to the *Schweizerische Medizinische Wochenschrift*, 5,500 women doctors are in practice in Japan.

Professor Angel H. Roffo, the well-known Argentine research worker on cancer, has been made an honorary doctor by the University of Guatemala.

Mr. Arthur Sims of Christchurch, N.Z., has presented to the N.Z.E.F. equipment for a mobile surgical unit on the lines of the mobile head unit which saw service with the B.E.F. in France. The organization and equipment have been greatly helped by the advice of Colonel Hugh Cairns of Oxford, consultant neurological surgeon to the R.A.M.C., the senior officers of the R.A.M.C., officers of the E.M.S., and Mr. Bullock of the Morris works.

The St. John Ambulance Association at Capetown has contributed £1,200 to the Lord Mayor's Red Cross and St. John Fund for the Sick and Wounded in the War.

The Committee for the Celebration of President Roosevelt's birthday has reported that the 1940 "Fight Infantile Paralysis Campaign" has reached a net total of $1,407,245.74.

The London Education Committee reports that as the Board of Education has increased the grant for the provision of meals and milk for children in wartime, such increase in the case of London will be approximately from 38 to 58% of the cost.

The Hadassal Emergency Committee has decided to allocate £500 for hospital purposes at Tel-Aviv to be used especially for additional surgical facilities.

Many Jews in occupied and unoccupied France—including Dr. Berthou, head of the Jewish Hospital in Paris—have committed suicide.

EPIDEMIOLOGICAL NOTES

Infectious Diseases for the Week

During the week under review there have been increased notifications of measles, whooping-cough, and scarlet fever. Increases are also recorded for cerebrospinal fever and acute poliomyelitis. The incidence of infectious diseases generally was unusually low in 1939. Comparison with the figures for 1938 shows that during the present year scarlet fever and cerebrospinal fever are more, and diphtheria and acute poliomyelitis less, prevalent; there is no increased prevalence of enteric fever. Comparable figures are not available for measles and whooping-cough.

Whooping-cough

In large towns increased prevalence or sub-epidemics of whooping-cough alternate with the biennial periodicity of measles, usually following rather than preceding the latter. For the last six weeks there has been a more or less steady increase in the incidence of whooping-cough, and notifications suggest that it is as widespread in country districts as in densely populated areas. Figures for the four largest cities are: Birmingham 195, Manchester 23, Liverpool 16, London 9, while the order of measles incidence is Liverpool 731, Manchester 598, London 215, Birmingham 56. Further figures for whooping-cough are: Lancaster 306 (Blackpool 49, Liverpool 16, Manchester 23, and numbers varying from 1 to 10 in thirty-five urban districts and rural districts); Warwick 219 (Birmingham 195, Coventry 9); Stafford 119 (Smethwick 16, Walsall 15, Wolverhampton 14, Stoke-on-Trent 10, Wednesfield U.D. 16); Chester 60 (not more than 5 in any of the four county boroughs, but 17 in Stalybridge M.B. and 13 in Macclesfield M.B.); Southampton 60 (Bournemouth 15, Portsmouth and Southampton 1 each, Eastleigh M.B. 7, Fareham U.D. 9, Winchester R.D. 20).

In Scotland whooping-cough is more prevalent in comparison with measles than in England and Wales: notifications are available from nine administrative areas; the county of Lanark 11, and the burghs of Dundee 30, Greenock 29, Glasgow 17, Aberdeen 13, Paisley 10, Dunfermline 6, Edinburgh 2, and Kirkcaldy 1.

No. 42

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended October 19, 1940.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1940 (a)	1940 (b)	1940 (c)	1940 (d)	1940 (e)	1939 (Corresponding Week) (a)	1939 (b)	1939 (c)	1939 (d)	1939 (e)
Cerebrospinal fever	144	16	36	—	3	18	1	7	—	2
Deaths		—	3				—	—		
Diphtheria	1,347	62	386	41	33	975	35	189	61	31
Deaths	44	1	10	3	1	22	—	5	2	—
Dysentery	47	2	60	—	—	62	4	39	1	—
Deaths			—	—	—			—	—	—
Encephalitis lethargica, acute	2	—	—		—	1	—	—		—
Deaths		2	1				—	1		
Enteric (typhoid and paratyphoid) fever	37	2	4	6	2	31	1	2	5	—
Deaths	—	—	—	—	1	—	—	—	1	—
Erysipelas		20	54	5	6			57	8	2
Deaths		1	2				—	—		
Infective enteritis or diarrhoea under 2 years	38	5	14	13	4	31	—	13	7	7
Deaths										
Measles*	11,229	215	491		11			5		5
Deaths	25	—	4	3	—	1	—	—	—	—
Ophthalmia neonatorum	86	2	21		—	74	5	24		2
Deaths										
Pneumonia, influenzal†	732	61	9	1	3	493	31	5	4	11
Deaths (from influenza)	14	3	2	—	—	23	3	1	—	—
Pneumonia, primary			183	8				123	17	
Deaths‡		65		9	1		9		8	5
Polio-encephalitis, acute	—	—				3	—			
Deaths		—					—			
Poliomyelitis, acute	36	—	6	—	—	37	2	1	1	—
Deaths		—	—				—	—		
Puerperal fever	1	1	17	1	1	3	3	11	4	—
Deaths		—					1§			
Puerperal pyrexia	143	3	27		1	156	2	9		1
Deaths										
Relapsing fever	—	—			—	1	1			—
Deaths										
Scarlet fever	2,149	86	247	74	45	1,336	28	212	67	105
Deaths	2	—	1	—	—	2	—	—	—	1
Small-pox	—	—	—		—	—	—	—		—
Deaths		—	—	—	—		—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths			—	—	—			—	—	—
Whooping-cough*	1,499	9	119		21			24		5
Deaths	8	1	—	1	—	5	1	3	—	—
Deaths (0-1 year)	300	29	67	31	11	243	14	76	22	17
Infant mortality rate (per 1,000 live births)										
Deaths (excluding still-births)	6,594	2,003	613	167	106	4,421	650	649	176	124
Annual death rate (per 1,000 persons living)			12.4	11.1	9.3			13.1	11.8	10.9
Live births	5,834	738	840	337	222	5,583	664	851	322	219
Annual rate per 1,000 persons living			17.0	22.5	19.4			17.2	21.6	19.2
Stillbirths	217	13	46			219	20	41		
Rate per 1,000 total births (including stillborn)			52					46		

* Made notifiable generally on November 1, 1939.

† Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.

‡ Since January 1, 1940, figures for London (b) have been for deaths from all forms of pneumonia; the corresponding figures for 1939 relate to deaths from lobar pneumonia only.

§ Death from puerperal sepsis.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.

ORIGINAL ARTICLES and LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone unless the contrary be stated.

Authors desiring REPRINTS of their articles must communicate with the Secretary, B.M.A. House, Tavistock Square, W.C.1, on receipt of proofs. Authors over-seas should indicate on MSS. if reprints are required, as proofs are not sent abroad.

ADVERTISEMENTS should be addressed to the Advertisement Manager (hours 9 a.m. to 5 p.m.). Orders for copies of the *Journal* and subscriptions should be addressed to the Secretary.

TELEPHONE NO.—B.M.A. and *B.M.J.*: EUSTON 2111.

TELEGRAPHIC ADDRESSES.—EDITOR, *Aitiology Westcent, London;* SECRETARY, *Medisecra Westcent, London.*

B.M.A. SCOTTISH OFFICE: 7, Drumsheugh Gardens, Edinburgh.

QUERIES AND ANSWERS

Constipation following Appendicectomy

"M.B., M.R.C.S." writes: Can anyone suggest a line of investigation or treatment for the following case, which I have seen recently for the first time? A healthy girl aged 14 had an appendicectomy in June last. She was in the nursing home for two weeks and made a normal recovery. There were no unusual features in the operation. She is at a boarding school where every attention is given to the girls' health, there being two fully trained nurses in residence. Since leaving the nursing home she has not had a single normal bowel action. She has had practically every form of diet and medication, and castor oil, liquid paraffin, petrolagar, cascara, senna, health salts, have proved useless. She is now having "all bran" in the morning, a tablespoonful three times daily of petrol c agar c phenolphthalein, the latter present as six grains to the ounce, and finally a tablespoonful of lixen at night—and yet no bowel action. She has a soap enema every other day, of which she can take only 1½ pints, and which produces a small constipated result. There is sometimes a little mucus. She plays games and does school work like a normal girl. Occasionally she has an unexplained temperature of 99° to 100° for a few days. Physically she is normally developed and healthy-looking; the abdomen is not distended at all; nothing abnormal is palpable, and no peristalsis to be heard. Per rectum no faeces felt. I suppose she is a case of megacolon; but does the condition develop suddenly, and would not a case of megacolon tolerate several pints of enema? An opaque meal and enema is to be arranged, but I am not hopeful that it will help very much. I should be grateful for suggestions.

Blood-stained Semen

Mr. W. A. WETHERLEY-MEIN (Bournemouth) writes: In reply to "Inquirer" (November 9, p. 655), Young's *Practice of Urology* (vol. ii, p. 112) states that it may occur in prostatitis or tuberculosis, and rarely in carcinoma or hypertrophy of the prostate. In recent years I have had four cases of haematospermia, three of which showed tuberculosis of the prostate; in the fourth, apart from a prostatitis, no definite organism was discovered; all four patients were under 50 years of age. In my experience (1) tuberculosis is the most likely cause, and the prognosis is bad in these cases—one of these three patients died within three months with generalized tuberculosis; (2) it is definitely not a male menopausal condition. Where tuberculosis is established Young's operation—removal of prostate and seminal vesicles—should be performed. If the condition is due to a simple prostatitis sexual intercourse should be avoided and rectal lavage be performed with a two-way catheter. Cystoscopic examination should be carried out routinely. In none of my recent cases have any drugs been taken prior to the onset of haematospermia, nor was there any diminution in virility.

Dr. F. PARKES WEBER writes in answer to "Inquirer": My interest in the subject was originally due to my writing an abstract of a paper on haematospermia for a medical journal about 1893. Although a possible analogy with the discharge of sanguineous matter through the female nipple, owing to a mammary tumour, may suggest itself, there seems to be no justification for such alarm in most cases. The blood seems generally to be derived from the prostate or prostatic mucosa, and in one patient whom I knew a drop or two appeared at the urethral orifice in connexion with defaecation, as if expressed from the prostate by the passage of hard faeces. This

phenomenon lasted only for some weeks or months, but in the case in question the haematospermia lasted on and off for twenty or thirty years—in fact, till seminal emissions practically ceased after the age of 70 years or thereabout. The exact cause of this ordinary benign type of haematospermia is not likely to be proved, as it does not appear to disturb the general health or shorten life, whatever the exact cause may be. At a post-mortem examination in old age the previous occurrence of frequent haematospermia is likely not to reach the ears of the examining pathologist unless the patient were to mention in his will that he wished thirty guineas paid for specially investigating the subject ; but in really old age the patient himself may have forgotten all about it.

"COUNTRY PRACTITIONER" writes in reply to "Inquirer": Ten years ago I had a patient whose semen was uniformly blood-stained and generally of a brown colour. His wife had been dead some years, he was 60 years of age, and he discovered it through having distressing nocturnal emissions when rolling on to his back when asleep. He had no symptoms of enlarged prostate and was in perfect health. To-day he is in perfect health, although he has some enlargement of the prostate and sometimes has to pass water once during the night, but otherwise he has no trouble. In this case it would seem that if a label is required for the condition, "menopausal" would do as well as any other.

Dr. GEOFFREY PLATT (Birmingham) writes: The case described by "Inquirer" resembles greatly a case of my own in which a previously healthy middle-aged man complained of blood in the seminal fluid. There were no other symptoms, but there was found to be present a carcinoma of the prostate with metastatic growths already present in the skeleton. Like "Inquirer," I was unable at the time to find any mention of the symptom in the literature, and I have not met it since: but in the light of this case it would appear that carcinoma of the prostate might be carefully considered.

"TYMPANUM" writes: In answer to "Inquirer" (November 9, p. 655), his patient is probably suffering from a chronic vesiculitis, due to infection with *B. coli*, the gonococcus, or the streptococcus. On examination he may find one or both ducts thickened and enlarged. These patients at times may suffer an acute attack, with slight temperature, for a day or two, in which case massage of the ducts will prove if they contain pus. I have come across blood-stained semen in old men with prostatic trouble.

Dr. JOHN GORDON (Loughton) writes: With reference to "Inquirer's" note regarding haematospermia (November 9, p. 655). If this was real haematospermia, the blood being intermingled with the semen and actually coming from the seminal vesicles, then the commonest cause is the rupture of a small vein in the genital tract, which is usually due to an increased congestion of the genital apparatus over and above the patient's normal congestion. This might possibly occur in a nocturnal emission if the dream was more vivid than the patient usually experiences. If the condition was really one of haematuria, then of course the causes are varied and should be investigated.

LETTERS, NOTES, ETC.

Strangulated Hernia in Infancy

Dr. G. M. STOKER (Mitcham) writes: Mr. G. H. Steele (November 9, p. 656) need not fear that Dr. John Gordon's case (November 2, p. 594) or his own will foment a contest for the "youngest ever," for a case in an infant of 14 days was published under "Clinical Memoranda" (*Journal*, April 13, 1940, p. 615). This, so far as I am aware, is still the starting line in any "competition."

Mr. W. R. FORRESTER WOOD, F.R.C.S. (Hove), writes: The account of a strangulated inguinal hernia in an infant of 5 weeks reported by Dr. J. Gordon (November 2, p. 594) prompts me to record a similar case in a child of only 16 days. This infant was admitted to the Royal Alexandra Hospital for Sick Children, Brighton, on October 3 at 2 p.m. The history was that the child refused its 6 o'clock breast-feed that morning, and at 9 a.m. a hard red swelling was noticed for the first time in the right groin. He vomited his 10 o'clock feed. On admission strangulated right inguinal hernia was diagnosed; an attempt was made at reduction by means of an ice-bag, and elevation of the foot of the cot was made. At 5 p.m. the hernia had not reduced, and operation was performed under open ether. About two inches of plum-coloured small intestine was present in the congenital sac, but the testis was well descended. After stretching the neck of the sac and being certain of the viability of the bowel, reduction was effected and the neck of the sac closed off. The wound was closed and the child returned to bed without any dressing. A completely uneventful convalescence followed, and the bowels acted without difficulty on the following morning. At no time did the wound show any signs of becoming infected, and he was discharged home nine days after admission.

Red Palm Oil in Malnutrition

Dr. D. F. MOORE (Parkstone) writes: I should like to state that I attach the greatest possible constructive use to the part that red palm oil plays as a *natural* food, not only because of the peculiar opportunities it offers to research as an excluding factor in disease, but because of its protective action in malnutritional states in Nigeria. In an article which is about to be published in the *Journal of Tropical Medicine* I am attempting to show that red palm oil may not itself be of much use in this respect to other countries, because of the likelihood of objection to its use as a food, through the simple effect of custom among primitive peoples, and also because it would require special handling to retain its biological activity for use outside the areas in which it is grown; this would raise its cost beyond the purchasing power of the malnutritional class for whom it was intended. But the example remains. I am suggesting, therefore, that as we have seen in this country a very important development (albeit in the medicinal field) by the utilization of arachis oil as a diluent to carry vitamin concentrates A and D because of our shortage of cod-liver oil, this new departure could have very useful effects over-seas. Arachis oil is one of the most widely used and essential vegetable oil foods, and is normally devoid of vitamin A. As so many of the peoples of tropical countries have to depend on vegetable oil sources for their fats, and almost all of these, too, are devoid of vitamin A, one of the great causes of gross deficiency of A is explained. Now that commercial sources of concentrate (avian, mammal, fish livers, and ? even commercially extracted carotene) are available at comparatively cheap cost and in plentiful supply, "vitaminized" natural oil foods could be made a further and important means of introducing protection in these other lands. I do not suggest that vitaminization can be carried out wholesale by law, as in this country with margarine. Many natural oils are not stable, and there are definite reasons affecting custom—such as preparation, etc.—which would prevent such a process. Besides, the Administration could not afford such wide measures; but there are ways and means. Schools under Government supervision or control offer one of these. They can be used as a means not only of dissemination but of useful educative propaganda as well. Also a method might be adopted analogous to that which has been found so helpful in malaria prevention in British Guiana, the West Indies, and more recently in British West Africa—the sale by Government of quinine tablets at cost to the public at post offices. The sale of a "vitaminized" oil food natural to the dietary of the area (cost of vitaminization to be borne by the Administration) at current costs of the oil itself would offer a splendid opportunity to improve nutrition, and to help to prevent that particular form of child blindness which is due to vitamin A deficiency.

Benzyl Benzoate Treatment of Scabies

Dr. H. L. CRONK (County Medical Officer, Southampton) writes: I have read with interest the article by Surgeon Lieut. R. Ernest King (November 9, p. 626). I have recommended this treatment since April this year, and the only difficulty is in obtaining benzyl benzoate. I shall be grateful if anyone will tell me from whom regular supplies can be obtained.

Multiple Injections of Morphine

Dr. JOHN GORDON (Loughton) writes: With regard to Dr. E. B. Grogono's inquiry (November 9, p. 643) about the full morphine syringe in the pocket, surely he will need more than one injection of morphine if he is going to deal with a large number of casualties, and I suggest that the easiest way is to carry the syringe in a spirit-proof case and to have the morphine made up in solution in a rubber-capped bottle of 10 c.cm. capacity. If then he dissolves ten doses of morphine in the bottle he has only to fill the 1 c.cm. syringe to capacity to obtain the required dose for injection.

Wanted: Medical Literature for Czecho-Slovak Doctors

Mr. H. MILNES WALKER writes: I have been during recent months in touch with some of the medical men working in the Czecho-Slovak Army now serving in this country. There are a considerable number of them, some serving as medical officers, others in the ranks. They have asked me if I can get hold of some current medical literature, and I send them what I can. However, they could do with a larger supply, which will be read from cover to cover, and if anyone would care to forward to them copies of medical and surgical journals I will be glad to put him in touch with those who will enjoy them.

Corrigendum: Crookes's Dark-adaptation Tester

The price of Crookes's dark-adaptation tester, described in the *Journal* of November 9 (p. 631), is fifteen guineas, not five as there stated.